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The Costs of Rural Public Health Services*

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THE purpose of this paper is to give some information on the cost of public health services as rendered in certain rather typical rural areas in two states. It is hoped that this report, based on a study made by the Mississippi and Tennessee State Departments of Health and the Commonwealth Fund, may have some value either in stimulating thought and study along this line or as an aid to administrators in program planning.

Cost data are usually developed in any field for one of two reasons: either to determine the relative monetary efficiency of particular services or methods, or to be used as the basis for the planning of new programs. The expansion of public health services in terms of the number of new units organized has been so rapid in the past few years that little attention has been given to the unit cost of service and the relative costs of different services in a local public health program. Too frequently the procedure in organizing new units has been to say: here is a county which ought to have a health department; it could probably support one with state help; the population is so much; we can probably find money for a four, five, or six piece unit. Almost without exception staff and budget needs of the area have been underestimated and the wonder is that so many of these newly formed units have survived when the limitations of their budgets are considered.

In any construction work the amount of a particular element that goes into the job is determined after there has been a very careful consideration of the character of the job to be done. The cost of each element is then calculated on the basis of the local supply. If we are building a house we know how much must go into foundation, framing, plastering, finishing, plumbing, heating, lighting, painting, and so forth. But, I hear you say, suppose we want to build

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† Dr. Walker died September 27, 1941.

a house for only $5,000 or $7,000 because that is all the money we have. We must still go back to the unit cost of materials in order to see where we may, by elimination, save the most money and still have a strong basic structure. There are some items that are essential and cannot be eliminated no matter what the cost; other items can be reduced in part without seriously hampering the purpose for which we are building, and still others can be eliminated entirely. This is equally true of public health programs or any other kind of public service endeavor.

The growth of certain phases of the public health program under the impetus of national propaganda, particularly the venereal disease service, has increased the amount of staff time and attention going into this field materially in practically every local health department in the last three years. Where there has been no corresponding increase in staff within the department this increase in attention to syphilis and gonorrhea has been made usually at the expense of other services. If we proceed on the assumption of a fixed budget and personnel as is so frequently the case, we must then ask ourselves whether the increased time spent on these services is in fact worth while. In some instances this increase of time is more apparent than real and because the tuberculosis program or the venereal disease program is being discussed by everyone and is uppermost in the mind, it is assumed that it takes an inordinate proportion of time whether it does or not.

Since the cost of personnel makes up the bulk of public health cost in an area, it is appropriate to begin any study of the cost of services with the distribution of time devoted to the various aspects of the public health program. During 1940, the field staff of 8 county health departments, 6 in Tennessee and 2 in Mississippi, kept time records on all services for the entire year. Each member of the field staff made a note of the time when each service was begun and when it was finished. This was entered on the daily report form opposite the visit, inspection, or other service. From these notations a special record was made by each professional staff member showing the hours and minutes devoted to the various types of service on a particular day. These time reports contained items which pertained specifically to medical, nursing, dental, and sanitarian services. From these we may get the distribution of time of the professional personnel to the items in the public health program of the area. The professional hours devoted specifically to travel and other related activities have been prorated to the various services. The total cost of medical, nursing, or sanitation services includes not only salary and travel but also the cost of clerical time, general supplies, and overhead. The cost for clerical time, supplies, and overhead was prorated in accordance with the distribution of professional time.

The figure on total cost of medical, nursing, sanitation, and dental professional time per hour thus arrived at is set forth in Table 1 for the several counties. We note that the hourly cost of medical service varied from a low in Lincoln County of $1.64 to a high in Pike County of $2.35. In the Tennessee counties the medical costs are based upon full-time personnel. In the 3 small units there is the health officer working alone; in others, there are a health officer and one or more full-time assistants. In the Mississippi counties, the full-time medical personnel is assisted in clinical activities by part-time clinicians employed from the local group. The variation in the per hour costs of nursing service is due almost entirely to the fact that in some counties student nurses made a contribution and their annual rate of compensation is below that of the regular staff. The variation

TABLE 1

Hourly Cost of Health Department Service by Size of Staff and by Type of Personnel, 1940

	Medical	*Nursing*	*Sanitation*	*Dental*
Counties with small staff:				
Blount, Tenn.	$1.83	$1.01	$1.11	....
Greene, Tenn.	1.89	1.05	1.05	....
Lincoln, Tenn.	1.64	1.11	1.13	....
Counties with large staff:				
Gibson, Tenn.	1.86	1.03	.96	....
Rutherford, Tenn.	2.09	1.00	1.15	....
Sullivan, Tenn.	2.07	.98	1.21	....
Lauderdale, Miss.	2.07	.92	1.25	$1.23
Pike, Miss.	2.35	1.12	1.21	.86

in the per hour cost of sanitation personnel from $.96 to $1.25 seems to be due primarily to the consuming passion which the single sanitary inspector in Gibson County has for his job. He found approximately 20 per cent more time within the year for his official duties than was reported in other areas.

The cost of a particular service, such as communicable disease or venereal disease, was determined from the hourly cost for professional service and other expenditures. Special supplies, such as drugs for venereal disease clinics, films for tuberculosis, blue ribbons for the school program, maternity supplies for obstetrical nursing care, were charged to the particular service with which they were associated. Where the laboratory work rendered locally for a particular service could be separated, it was charged to the service with which it was connected. A summation of these costs by services gives the distribution of funds from the local basic public health budget to the various services. The basic budget does not, however, usually include all the public health services which go into the program of the local community.

Though the basic budgets may include local, state, and federal funds, there are other expenditures going into the total cost of public health services. These include contributions by other public agencies in the community, such as civic

TABLE 2

Amount and Percentage of Total Expenditures from Basic Budget and Other Sources by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Population	41,294	39,512	31,569	44,835	33,637	69,535	58,384	35,072
Basic budget	$11,474	$11,823	$11,236	$31,720	$31,534	$34,558	$42,640	$30,021
Per cent	87.9	86.9	83.9	92.5	87.6	84.2	92.5	95.3
Other local agencies	....	420	420	120	131	45	....	....
Per cent	....	3.1	3.1	0.4	0.4	0.1	....	....
State services *	1,576	1,354	1,736	2,139	2,351	5,025	1,500	1,484
Per cent	12.1	10.0	13.0	6.2	6.5	12.3	3.3	4.7
Student services	....	....	....	300	1,350	100	1,952	....
Per cent	....	....	....	0.9	3.7	0.2	4.2	....
Voluntary medical	....	....	....	....	644	1,311	....	....
Per cent	....	....	....	....	1.8	3.2	....	....
Total	$13,050	$13,597	$13,392	$34,279	$36,010	$41,039	$46,092	$31,505

* State services include: Laboratory cost, salary of clinicians, x-ray films, vaccines, syphilis drugs, and so forth.

clubs or by voluntary public health agencies, such as the tuberculosis association, services provided by the state for the community, which include diagnostic service for tuberculosis or venereal disease, laboratory service in a number of fields, and also biologicals supplied from state funds. Record forms and literature were supplied in these areas without cost and no attempt has been made to assign money value to these items. Similarly, there is voluntary professional work, particularly from physicians, in connection with school examinations or clinic services that is not included in the basic health department budget.

In Table 2 are shown the total expenditures for public health services in these 8 counties when the cost of services from all sources is included. It will be noted that these states made contributions in service rather than money, to local service, varying from $1,354 to $5,025. This is over and above any funds from state or federal sources contributed directly to the basic budget. In those areas in which a training program is carried on, as mentioned above, an appreciable amount of service is rendered by the students.

If we consider the percentage of total expenditures which is represented by state services in the small units, this amounts to from 10 to 13 per cent. In the units with larger staffs and larger budgets, this is not such a large factor, varying from 3.3 to 6.5 per cent. In Sullivan County, however, a special venereal disease clinician supplied by the state on a part-time basis brings this item up to 12.3 per cent.

In Table 3, the percentage of total expenditures going into each service in each county is shown. It will be noted that the venereal disease program in 5 of the 8 counties takes either first or second place in terms of expenditures. In fact, when the total for the 8 counties is considered, the venereal disease expenditure, varying from $2,526 to $14,121, outranks other expenditures, and the cost of school services takes second place. In the two units with obstetrical nursing service, Gibson and Pike, this service is the most costly and venereal disease service second.

If we consider the average expenditures (Table 4) in these 8 counties as relatively typical of large and small units throughout the country, we see that of the $229,000 spent for public health services in 1940, 22.8 per cent, or over $52,000, was spent for venereal disease services; 15.8 per cent was spent for school hygiene services, 14.0 per cent for maternity hygiene, 11.9 per cent for infant-preschool, and 11.3 per cent for acute communicable disease control.

If we separate these counties into

TABLE 3

Total Expenditures and Percentage by Service and by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Total expenditure	$13,050	$13,597	$13,392	$34,279	$36,010	$41,039	$46,092	$31,505
	Percentage							
Communicable disease	14.5	24.0	20.9	9.2	14.0	10.7	7.7	5.8
Venereal disease	23.7	18.6	15.2	21.2	12.5	34.4	25.2	22.3
Tuberculosis	12.3	9.1	15.1	6.2	8.7	10.5	3.5	4.1
Maternity	3.3	2.4	2.2	28.0	11.1	4.1	12.4	31.5
Infant-preschool	6.2	6.7	7.1	10.9	17.1	9.2	14.0	13.8
School	19.3	23.8	21.0	14.2	19.0	15.7	12.3	11.9
Adult hygiene	0.9	1.1	1.9	1.0	6.7	1.6	0.9	1.7
General sanitation	11.9	10.8	14.0	5.6	4.0	8.4	5.0	5.8
Food and milk	7.9	3.5	2.6	2.4	2.3	4.6	9.2	2.4
Student program	....	....	....	1.3	4.6	0.8	9.8	0.7

TABLE 4

Average Expenditure for All Services and Average and Percentage Expenditure for Each Service by Size of Staff, 1940

	Average for All Counties		Average for Small Staff		Average for Large Staff	
	Amount	Per cent	Amount	Per cent	Amount	Per cent
Communicable disease	$3,240	11.3	$2,649	19.8	$3,595	9.5
Venereal disease	6,523	22.8	2,551	19.2	8,905	23.5
Tuberculosis	2,162	7.6	1,618	12.1	2,489	6.6
Maternity	4,000	14.0	347	2.6	6,191	16.4
Infant–preschool	3,395	11.9	893	6.7	4,898	13.0
School	4,517	15.8	2,853	21.4	5,516	14.6
Adult hygiene	612	2.1	176	1.3	873	2.3
General sanitation	1,976	6.9	1,634	12.2	2,182	5.8
Food and milk	1,297	4.5	622	4.7	1,701	4.5
Student program	899	3.1	....	....	1,438	3.8
Average	$51,131	100.0	$13,346	100.0	$37,785	100.0

those with five piece units and those with a more adequate staff, we see that the ranking of expenditures by services is materially changed. In the smaller units with less adequate staffs, the school program takes the largest expenditure, followed by acute communicable disease control, venereal disease control, general sanitation, and tuberculosis, in that order. In the counties with the larger staffs, the venereal disease program ranks first, followed by maternity hygiene, school, infant-preschool, and acute communicable disease, in that order.

Though the per capita cost of the various services is not the best unit for cost comparisons, it is one which is frequently used and for these 8 counties is set forth in Table 5.

There are some rather interesting modes indicated in this table. For example, an expenditure of 6 to 8 cents per capita for acute communicable disease control is usual. Expenditures of 6 or 7 cents for venereal disease control in small counties are common, but if there is a large urban population and a large clinic service it costs about 20 cents per capita. Counties with active tuberculosis programs spend from 6 to 9 cents for case finding and follow-up. Five piece units have relatively little time for the hygienes other than school hygiene, and spend little money in these brackets. About 10 cents per capita will do a fair job in maternity hygiene, but if a delivery service is included as a part of the program it will cost at least double this amount. It is common

TABLE 5

Per capita Cost of Health Department Service by Type of Service and by County, 1940

	Small Staff			Large Staff				
	Blount	Greene	Lincoln	Gibson	Rutherford	Sullivan	Lauderdale	Pike
	Cents	Cents	Cents	Cents	Cents	Cents	Cents	Cents
Communicable disease	4.6	8.3	8.9	7.1	14.9	6.3	6.1	5.2
Venereal disease	7.5	6.4	6.5	16.2	13.4	20.3	19.9	20.0
Tuberculosis	3.9	3.1	6.4	4.7	9.3	6.2	2.7	3.7
Maternity	1.0	0.8	0.9	21.4	11.9	2.3	9.8	28.3
Infant–preschool	2.0	2.3	3.0	8.3	18.4	5.4	11.0	12.4
School	6.1	8.2	8.9	10.8	20.3	9.3	9.7	10.7
Adult hygiene	0.3	0.4	0.8	0.8	7.2	0.9	0.7	1.6
General sanitation	3.7	3.7	5.9	4.3	4.3	4.9	3.9	5.2
Food and milk	2.5	1.2	1.1	1.8	2.4	2.7	7.3	2.1
Student program	...	...	...	1.0	5.0	0.5	7.8	0.6
Total	31.6	34.4	42.4	76.4	107.1	59.0	78.9	89.8

TABLE 6

Medical Cost and Percentage by Type of Service and by County, 1940

	Small Staff			Large Staff				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Medical cost	$4,755	$5,383	$5,079	$9,696	$12,462	$11,862	$12,586	$6,995
	Percentage							
Communicable disease	21.8	38.8	28.8	18.4	27.1	21.1	14.9	4.1
Venereal disease	37.2	26.1	24.7	47.0	15.2	44.6	47.7	58.8
Tuberculosis	14.1	7.9	15.2	7.5	9.2	15.3	3.7	6.4
Maternity	....	....	....	....	6.5	....	8.1	7.8
Infant–preschool	3.0	1.5	4.9	3.6	10.5	7.1	9.7	5.5
School	22.6	23.5	22.2	20.1	20.3	9.9	8.3	12.0
Adult hygiene	1.3	2.2	4.2	3.0	10.0	2.0	0.5	5.2
Student program	....	....	....	0.4	1.2	....	7.1	0.2

for counties to spend 10 cents per capita for school hygiene services. General sanitation can be financed at about 5 cents per capita and a reasonable food and milk control program at about 2.5 cents per capita.

In Table 6 are shown the total medical cost and the percentage of the expenditure for medical services in the various activities by county. The limitations of the medical staff in the five piece unit and its effect upon the distribution of medical service in some fields will be noted. In 5 of the 8 counties venereal disease service accounts for the largest proportion of medical expenditures. In the other 3 counties it is the acute communicable disease program. Though there is a rather striking uniformity of percentage of medical time devoted to school service by 5 of the 8 counties, the variation in this field is from 8.3 to 23.5 per cent. One would naturally expect a wide variation in the entire time devoted to the acute communicable disease services, dependent upon the magnitude of the problem. The variation in the school service, however, must depend upon differences in program.

The total nursing cost and the percentage of total expenditures for nursing service allocated to the various activities are shown in Table 7. The expenditure for nursing service in these counties varies from about $4,500 in the five piece unit to between $18,000 and $19,500 in the larger units. In the smaller staffs, the major emphasis is placed on the school program, which accounts for more than 25 per cent of the expenditure. In the 2 counties, Gibson and Pike, which carry on an obstetrical nursing program, the maternity service accounts for the greatest expenditure, amounting to between 40 and 50 per cent in each county.

The demands of the acute communicable diseases upon the small staffs are

TABLE 7

Nursing Cost and Percentage by Type of Service and by County, 1940

	Small Staff			Large Staff				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Nursing cost	$4,494	$4,776	$4,525	$19,350	$19,321	$19,435	$19,047	$18,325
	Percentage							
Communicable disease	14.7	20.1	23.3	5.2	6.6	7.3	5.5	5.3
Venereal disease	17.2	14.7	8.2	9.3	10.3	31.0	14.0	13.4
Tuberculosis	15.3	14.3	17.7	5.3	9.2	9.4	4.2	4.4
Maternity	9.6	6.7	6.4	46.1	15.5	8.8	23.0	50.7
Infant–preschool	14.8	17.4	15.6	17.5	25.2	15.0	23.5	20.8
School	27.9	26.0	27.8	14.2	19.7	24.7	10.3	4.8
Adult hygiene	0.5	0.8	1.0	0.3	6.1	2.1	0.6	0.6
Student program	....	....	....	2.1	7.4	1.7	18.9	....

TABLE 8

Sanitation Cost and Percentage by Type of Service and by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Sanitation cost	$2,628	$2,591	$2,624	$2,808	$2,601	$5,454	$6,613	$3,030
	Percentage							
Communicable disease	0.1	....	1.6	....	4.2	....	0.4	0.1
School sanitation	7.2	26.9	14.7	3.9	16.2	6.5	11.5	12.5
General sanitation	56.6	55.6	71.0	67.4	51.4	62.6	30.3	60.2
Food and milk	36.1	17.5	12.7	28.7	24.9	30.9	57.3	20.7
Student program	....	....	....	....	3.3	....	0.5	6.5

indicated by the proportion of total nursing costs going into this field in the smaller counties, which varies in this group from 14 to 23 per cent, while those counties with more adequate staffs spend between 5 and 7 per cent of the total cost of nursing service in this field.

In Table 8 are shown the total expenditures for sanitation services in the counties and the proportion of these expenditures allocated to the various activities. In 7 of these counties the major expenditure is made on general sanitation; however, in Lauderdale County, with a 60 per cent urban population, the bulk of the expenditure is made on food and milk control. This county probably has more nearly completed its job of improving the sanitary condition than any of the others. This is due particularly to the fact that it has had a large staff of sanitarians over a period of years.

It will be recalled that these counties received from $1,500 to $5,000 worth of service from the state departments which does not appear as a part of the basic budget. This represents from 3 to 13 per cent of the total expenditures. The percentage distributed to each service is shown in Table 9. It seems particularly significant that practically this entire expenditure in terms of service from the state department goes into communicable disease control either for the acute diseases, venereal diseases, or tuberculosis.

We may now carry our analysis of unit costs one step further and look at costs of field visits by nursing personnel in the various services. These are set forth in Table 10. The variations here are due to two factors: first, the variation from county to county in the average time devoted to a field visit in each service, and second, the basic cost of one hour of nursing time, which depends upon the salaries paid. It is clear that

TABLE 9

State Expenditure and Percentage by Type of Service and by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
State expenditures	$1,576	$1,354	$1,736	$2,139	$2,351	$5,025	$1,500	$1,454
	Percentage							
Communicable disease	11.7	14.5	12.0	16.5	20.6	5.8	20.3	38.3
Venereal disease	34.5	53.9	23.3	40.3	32.0	66.7	67.8	28.8
Tuberculosis	46.4	29.0	62.9	41.1	7.3	23.0	11.2	25.2
Maternity	....	....	....	0.9	....	....	....	....
Infant–preschool	....	....	....	....	5.4	....	....	....
School	....	....	....	....	29.7	....	....	....
Adult hygiene	....	....	....	....	3.6	....	....	....
General sanitation	2.1	0.6	0.9	1.2	....	0.5	....	....
Food and milk	5.3	2.0	0.9	....	0.5	4.0	0.7	7.7
Student program	....	....	....	....	0.9	....	....	....

TABLE 10

Cost per Nursing Visit by Type of Visit and by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Field visit:								
Tuberculosis	$ .90	$ .88	$ .63	$ .56	$ .72	$ .61	$ .40	$ .72
Antepartum	1.88	1.53	1.23	1.58	1.47	1.34	.97	1.39
Postpartum	.83	.94	.83	.86	.81	.77	.78	.93
Infant	1.17	1.11	.58	.81	.90	.77	.58	.77
Preschool	.52	.69	.46	.51	.58	.47	.37	.50
School	.51	.56	.45	.38	.47	.53	.28	.41

the antepartum visit is the most expensive; that though there is considerable range of costs in some fields, others, like postpartum and school visits, do not vary much from county to county. In calculating these costs, not only the time spent in the actual making of visits but the time spent in travel and the cost of related activities, which it is believed contribute to the success of the visit, are also included.

TABLE 11

Medical and Nursing Cost per Clinic Visit by Type of Service and by County, 1940

	Small Staff			*Large Staff*				
	Blount	*Greene*	*Lincoln*	*Gibson*	*Rutherford*	*Sullivan*	*Lauderdale*	*Pike*
Syphilis clinic:								
Medical time	$ .66	$ .77	$ .64	$ .52	$ .56	$ .31	$ .26	$ .73
Nursing time	.29	.39	.19	.21	.59	.36	.12	.44
Total	$ .95	$1.16	$ .83	$ .73	$1.15	$ .67	$ .38	$1.17
Tuberculosis clinic:								
Med. time, local	$ .59	$1.01	$ .29	$ .41	$1.26	$1.55	$ .44	$ .36
Nurs. time, local	.93	1.68	.90	.66	.75	1.79	.32	.64
Med. time, state	1.53	1.76	1.51	.99	.18	1.34	.29	1.09
Med. time, voluntary	....	....	....	....	.19	.74	....	....
Total	$3.05	$4.45	$2.70	$2.06	$2.38	$5.42	$1.05	$2.09
School examination:								
Medical time	$ .28	$ .29	$ .35	$ .32	$ .49	$ .25	$ .26	$ .53
Nursing time	.18	.25	.21	.14	.25	.20	.14	.14
Total	$ .46	$ .54	$ .56	$ .46	$ .74	$ .45	$ .40	$ .67

In Table 11 is shown cost of certain clinic services. In calculating these costs, medical and nursing time have been used but no item has been included for drugs used in the syphilis clinic or x-ray films in the tuberculosis clinic. It will be noted that the total cost of the syphilis clinic visit varies from $.38 to $1.17. Tuberculosis clinics cost more in Sullivan County and less in Lauderdale County than in any other. The high cost in Sullivan is due at least in part to the pneumothorax treatment clinic operated under supervision of the health department. This cost is more than 60 per cent medical in 6 counties. The school examination costs from $.40 to $.74. For the average small units it is 59 per cent medical and 41 per cent nursing. For the average large unit, it is 70 per cent medical and 30 per cent nursing.

In Table 12, the cost per inspection of private premises, food handling establishments, and dairy farms is set forth. The inspections of food handling establishments are given for only 3 counties, as the number reported by the others was negligible.

TABLE 12

Cost per Inspection by County and by Type of Service, 1940

	Private Premises	*Dairy Farm*	*Food Establishment*
Counties with small staff:			
Blount	$ .62	$1.78	....
Greene	.71	1.52	....
Lincoln	2.09	2.05	....
Counties with large staff:			
Gibson	.61	1.96	....
Rutherford	1.75	2.10	....
Sullivan	.72	1.77	$1.89
Lauderdale	1.38	3.02	.51
Pike	1.70	2.22	.85

Lauderdale County in 1940 reported 8,617 dental inspections of school children. The cost for this service was 8.9 cents per inspection. Pike County reported 2,496 such inspections at a cost of 21.3 cents per inspection.

We may conclude that program emphasis will and probably should shift and that these distributions of costs will change accordingly. From these analyses, one preparing a budget for a local health department may judge the amount of money needed for certain services. There is no indication that these are the best distributions, but they do represent the cost in representative counties.

From this analysis of time and cost spent in various health department activities in these 8 typical rural counties it seems that:

The basic budget of the health department represents only from 83.9 to 95.3 per cent of the total expenditures.

The cost per hour of medical service varies from $1.64 to $2.35; nursing service from $.92 to $1.12, and sanitation service from $.96 to $1.25.

Field time represents less than half the cost of field and clinic visits.

Time of examination represents less than half the cost of school examination.

In more than half the counties, syphilis clinic service ranks either first or second in expenditures.

In small units, the school service takes from 26 to 28 per cent of the total expenditure for nursing service.

From 23.3 to 67.8 per cent of the money spent for state service is chargeable to the syphilis control program.

The antepartum visit is the most expensive and ranges from $.97 to $1.88.

The cost of a syphilis clinic visit ranges from $.38 to $1.17; a tuberculosis clinic visit from $1.05 to $5.42, and a school examination from $.40 to $.74.

NOTE: Details of both time and cost figures are available at the Commonwealth Fund, 41 E. 57 St., New York, N. Y., and will be sent to anyone who desires additional information.

Diphtheria Immunization with Fluid Toxoid and Alum-Precipitated Toxoid*

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THE purpose of this study was to investigate the height and duration of the antitoxin response following injection with fluid or alum-precipitated toxoid. When the study began in 1936, immunization against diphtheria was attempted largely by one injection of alum-precipitated toxoid, or two or three injections of fluid toxoid. It was felt to be highly desirable to determine which of these was the method of choice. The most conclusive study would have been a comparison of the resistance to actual exposure to diphtheria following the different immunizing procedures. Since the low incidence of diphtheria made this impossible, it was decided that the next most valuable study would be a comparison of the antitoxin response and the durability of that response.

METHODS

The study has been carried out on 2,487 free-living children from rural schools and communities in Saginaw County, Mich., a county of about 1,110 square miles.

The immunity response has been followed by blood serum titrations alone. No Schick tests were used because the Schick test itself has an antigenic effect, especially on a child with circulating antitoxin in its blood. Eliminating the Schick test made it possible:

1. To observe the comparative antitoxin response to the various immunizing procedures alone.
2. To follow the duration of the response without giving additional secondary stimulations.
3. To determine the responses to be expected in routine immunization when the Schick test is not used. The decreasing use of the Schick test made this important.

Therefore, before giving any antigenic stimulation, the children were bled. Four or five ml. of blood were taken in vacuum tubes (Keidel or Kimball). Each child was bled again 4 months after the first injection and at 12 months and every 12 months thereafter for the duration of the study.

The blood was titrated essentially by the method of Fraser.[1] The clotted blood was centrifuged at approximately 1,200 r.p.m. for 1 hour, the serum drawn off aseptically, and stored at 2–10° C. The serum of children not previously immunized was first tested to determine if it contained more or less than 0.001 unit of antitoxin per ml. by comparing the reactions in the skin of a rabbit on the intradermal injections of the following mixtures:

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Serum Control	0.2 ml. serum + 0.2 ml. saline
Test of Serum for 0.001 Unit	0.2 ml. serum + 0.2 ml. toxin dilution
Standard Control	1.0 ml. N.I.H. antitoxin + 1.0 ml. toxin dilution

The antitoxin in the standard control was the standard diphtheria antitoxin of the National Institute of Health. This was diluted 1:10 with 66 per cent neutral glycerine, in which dilution it keeps indefinitely in the cold. It was then made up to 1:6,000 with saline just before use. At this dilution 1 ml. contained 0.001 unit. The same toxin (No. 358) was used throughout the study and was diluted 1:6,700–1:7,200, varying a little with each new bottle. The optimum toxin dilution was determined by mixing several dilutions of the toxin with each of four dilutions of the National Institute of Health standard antitoxin, namely, 0.001 unit per ml., 0.002 unit per ml., 0.004 unit per ml., and 0.01 unit per ml. That dilution of toxin was chosen which showed the greatest difference in size between the reactions —usually that dilution which gave a + reaction on injection of the 0.001 unit mixture, a ± reaction to the 0.002 unit, and a negative reaction to the 0.004 and 0.01 unit mixtures. The toxin dilution was always added to the serum, the tubes were shaken, and allowed to stand ½ hour at room temperature. The syringes were filled while waiting, and the intradermal injections of 0.1 ml. of the mixtures made within a second ½ hour period. Clipped white rabbits were used, weighing from 5 to 8½ pounds. Forty-eight injections were placed on each rabbit, including six control injections, three at the front and three at the back. Readings were made on the 3rd and 4th day after injection by comparing the size of the reactions with those of the control injections. The reactions on the front half of the rabbits were compared with the controls on the front half, and those on the rear half with the rear controls.

If the serum proved to contain more than 0.001 unit it was retitrated, using the following dilutions:

0.01 Unit	0.1 ml. serum	+ 0.9 ml. saline	A
0.1 Unit	0.2 ml. A	+ 1.8 ml. saline	B
1.0 Unit	0.2 ml. B	+ 1.8 ml. saline	

After this titration determined the range in which the titer fell, the serum was again tested. The units tested for in the study were:

0.002	0.02	2.0	16.0
0.004	0.04	4.0	32.0
0.01	0.1	8.0	

The toxin was diluted for all mixtures in Fraser's buffer diluent which has the following formula:

Sorensen's borate—boric acid buffer { 12.404 gm. H_3BO_3 ; 100 ml. N NaOH ; Water to 1 liter }

To one liter add 818.1 ml. 0.1 N HCl to pH 7.9

{ 1,070 ml. buffer pH 7.9 ; 36.4 gm. NaCl ; 2,210 ml. H_2O } Autoclave 1 hour at 120° C.

0.85 gm. gelatin — Autoclave 1 hour at 120° C.

Add gelatin and sterile H_2O to make 4,280 ml. after autoclaving.

The following procedures were used in immunization of children:

1. 1 injection of fluid toxoid
2. 2 injections of fluid toxoid (3 weeks apart)
3. 3 injections of fluid toxoid (3 weeks apart)
4. 1 injection of alum-precipitated toxoid
5. 2 injections of alum-precipitated toxoid (3 weeks apart)

The toxoid used was obtained from a commercial firm by Dr. W. T. Harrison of the National Institute of Health so that it would be representative of toxoid generally available. The alum-precipitated toxoid was prepared from the fluid toxoid used in the study. This was felt to be important because of the possibility that two different preparations of toxoid might vary in some in-

trinsic antigenic efficacy for which we have no method of determination. The National Institute of Health tests showed the fluid toxoid to contain 20 L_f per ml. and the alum-precipitated toxoid to stimulate production of an average of 2–4 units of antitoxin in guinea pigs in the National Institute of Health control test for alum-precipitated toxoid. On the re-solution of the alum-precipitated toxoid it was likewise found to contain 20 L_f per ml. These tests were repeated and verified by the Michigan Department of Health.

A diphtheria carrier survey was carried out in the schools during the study. Throat cultures were taken at intervals from all the school children, irrespective of whether they had received immunizing injections. The throat cultures were examined by the Bureau of Laboratories of the Michigan Department of Health according to the following procedure:

Inoculate a tellurite plate and a Loeffler's plant with the specimen submitted. Incubate at 37° C. for 18–24 hours. Prepare smears from the Loeffler's slant and stain with Loeffler's methylene blue. If diphtheria-like organisms are found, re-incubate the tellurite plate for another 24 hours. Subculture typical colonies to Loeffler's medium and incubate 24 hours at 37° C. Wash off the growth with 2.0 ml. of tryptose broth. Inoculate 1 ml. subcutaneously into the abdominal wall of a guinea pig weighing 250–300 gm., and 1 ml. into a control pig of equal weight which has been previously injected intraperitoneally with 500 units of diphtheria antitoxin.

Autopsy pigs at death or at the end of 72 hours. Consider any cultures as toxigenic if the unprotected guinea pig exhibits edema, necrosis at site of inoculation, and hemorrhagic suprarenals, and the protected control guinea pig is normal at the end of the test period. Consider any culture as non-toxigenic if both pigs are normal at autopsy.

The carrier survey was felt to be essential to the evaluation of the antitoxic response obtained by the various immunizing procedures because one might expect a much higher antitoxin response in a locality with a high carrier rate of virulent diphtheria organisms and a lower response in a locality where exposure to virulent diphtheria organisms is a rarity.[2]

RESULTS

There are several reasons why the results of this study may be considered indicative of a safe minimum response to be expected from each of the immunizing procedures studied. They are:

1. The children were free-living children from 150 rural schools and their vicinities. A higher antigenic response might be expected from urban children or institutional children.

2. The children were living in a low diphtheria environment as shown by the results of the carrier survey (Table 1) and the incidence of diphtheria (Table 2). A higher response would be expected in the presence of a higher carrier or diphtheria rate.

3. The children were living in a northern state. Children in a southern state might be expected to give a greater antigenic response.[3]

TABLE 1

Saginaw County Diphtheria Survey
(Total Number of Cultures Taken: 31,363)

Time	Number of Children	Number of Children with Positive KL Culture		Number of Children with Pathogenic KL Culture		Number of Children with Non-pathogenic KL Culture		Number of Children with Positive KL Culture (No Virulence Test Made)	
		Number	Per cent	Number	Per cent	Number	Per cent	Number	Per cent
1936–1940	13,998	121	0.86	35	0.25	72	0.51	14	0.10

TABLE 2

Incidence of Diphtheria

Year	1936	1937	1938	1939	1940	1941
Cases of Diphtheria	4	3	0	0	0	0

TABLE 3

Age Distribution of Children in the Study

Age	1 A.P.	2 A.P.	1 Fluid	2 Fluid	3 Fluid	1 Fraser	2 Fraser	3 Fraser	Titr. No. Toxoid	Total	Per cent
8 mo.	1	1	1	..	..	..	..	..	..	3	....
1 yr.	5	4	..	2	..	..	..	..	..	11	....
1½ yr.	2	2	..	2	..	..	..	..	..	6	....
2 yr.	7	2	3	3	6	1	..	1	1	24	....
3 yr.	10	5	2	8	6	..	..	1	2	34	....
4 yr.	38	12	2	19	18	1	..	2	1	93	....
5 yr.	94	75	13	51	70	9	6	66	2	386	....
Total	157	101	21	85	100	11	6	70	6	557	22.3
6 yr.	153	123	22	110	158	6	3	65	..	640	....
7 yr.	131	77	8	70	84	1	1	24	4	400	....
8 yr.	89	51	10	31	59	1	..	10	4	255	....
9 yr.	57	50	6	34	62	..	..	4	..	213	....
10 yr.	31	25	5	31	36	..	..	..	2	130	....
Total	461	326	51	276	399	8	4	103	10	1,638	65.9
11 yr.	20	9	2	14	31	..	..	2	..	78	....
12 yr.	23	13	3	20	27	..	..	..	..	86	....
13 yr.	14	4	3	15	19	..	..	..	1	56	....
14 yr.	13	2	7	8	14	..	..	..	..	44	....
15 yr.	6	..	2	2	5	..	..	..	2	17	....
16 yr.	6	..	1	..	..	..	..	..	..	7	....
17 yr.	4	..	..	..	..	..	..	..	..	4	....
Total	86	28	18	59	96	..	..	2	3	292	11.8
Grand Total	704	455	90	420	595	19	10	175	19	2,487	100.0

The fact that 65.9 per cent of the children were 6 to 10 years of age, and 22.3 per cent were in the preschool age group (Table 3) makes the results of the study directly applicable to routine immunization against diphtheria, since these are the age groups usually concerned.

For part of the study, alternate children in a group were given two different immunizing procedures in order to have a strictly controlled comparison. These were called "Controlled Groups." For the rest of the study, different immunizing procedures were used in alternate schools or communities. These are listed as "Uncontrolled Groups" (Table 4).

It is evident that the results are comparable between the "Controlled" and the "Uncontrolled" groups when the responses of those children having less that 0.001 unit of antitoxin at the time

TABLE 4

Comparison of Antitoxin Response to the Different Immunizing Procedures in Controlled and Uncontrolled Groups
(Antitoxin level at time of 1st injection <0.001)

Immunizing Preparation and Procedure	Group	Four Months			Twelve Months		
		No. in Group	Children with 0.001 or More		No. in Group	Children with 0.001 or More	
			No.	Per cent		No.	Per cent
2 Injections fluid	Controlled	129	82	63.5	33	55	62.5
3 Weeks apart	Uncontrolled	31	20	64.5	23	12	52.1
1 Injection A.P.	Controlled	116	105	90.5	101	86	85.1
	Uncontrolled	236	222	94.0	226	199	88.0
3 Injections fluid	Controlled	113	113	100.0	..	..	....
3 Weeks apart	Uncontrolled	49	46	93.8	49	47	95.9
2 Injections A.P.	Controlled	138	138	100.0	..	..	....
3 Weeks apart	Uncontrolled	10	10	100.0	..	..	....

TABLE 5

Comparison of Antitoxin Response to the Different Immunizing Procedures
(All Cases having <0.001 Unit at Time of Injection)

Immunizing Procedure		*4 Days*				*10 Days*				*4 Months*				*12 Months*				*24 Months*				*36 Months*				*48 Months*				*60 Months*			
		Number of Cases	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.001 Unit or More*	*Cases with 0.01 Unit or More*	*Cases with 0.1 Unit or More*
1 Injection	No.	34	1	1	0	130	17	10	5	39	8	3	1	39	4	2	0	35	4	1	0	25	3	1	1	8	1	0	0	..	..	..	..
1 ml. Fluid	%	..	3	3	0	..	13	8	4	..	21	8	3	..	10	5	0	..	11	3	0	..	12	4	4	..	13	0	0	..	..	..	..
2 Injections	No.	..	..	..	..	..	..	..	..	243	157	71	18	235	126	53	15	226	113	48	13	168	77	32	5	87	42	17	2	..	..	..	..
1 ml. Fluid	%	..	..	..	..	..	..	..	..	..	65	29	7	..	54	23	6	..	50	21	6	..	46	19	3	..	48	20	2	..	..	..	..
3 Injections	No.	..	..	..	..	..	..	..	..	566	528	380	114	544	490	335	115	388	335	218	62	175	163	98	26	42	40	24	6	..	..	..	..
1 ml. Fluid	%	..	..	..	..	..	..	..	..	..	93	67	20	..	90	62	21	..	86	56	16	..	93	56	15	..	95	57	14	..	..	..	..
1 Injection	No.	19	0	0	0	87	22	16	15	374	345	210	54	367	316	170	27	394	317	139	24	359	256	92	18	297	199	66	15	114	76	25	6
1 ml. A.P.	%	..	0	0	0	..	25	18	17	..	92	56	14	..	86	54	7	..	81	35	6	..	71	26	5	..	67	22	5	..	67	22	5
2 Injections	No.	..	..	..	..	..	..	..	..	310	310	296	149	300	298	268	110	299	295	262	94	167	164	143	52	..	..	..	..	..	..	..	..
1 ml. A.P.	%	..	..	..	..	..	..	..	..	..	100	96	48	..	99	89	37	..	99	88	31	..	98	86	31	..	..	..	..	..	..	..	..

TABLE 6

Comparison of Antitoxin Levels in a Group of Children Having Three Injections of Fraser's Fluid Toxoid (0.5 ml.–0.5 ml.–1 ml.) in Children Having < 0.001 Units of Antitoxin at the Time of Injection

	Kind of Toxoid	No. of Children	Units of Antitoxin per One ml. of Serum: < 0.001		0.001 < 0.004		0.004 < 0.01		0.01 < 0.04		0.04 < 0.1		0.1 Plus	
			No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Four Months	Fraser	139	18	13	12	9	26	19	39	28	24	17	20	14
	U.S. P. H. S. Toxoid	428	21	5	53	12	57	13	132	31	71	17	94	22
	Total	567	39	7	65	11	83	15	171	30	95	17	114	20
Twelve Months	Fraser	127	13	10	8	6	21	17	37	29	19	15	29	23
	U.S. P. H. S. Toxoid	417	41	10	62	15	63	15	111	27	54	13	86	21
	Total	544	54	10	70	13	84	15	148	27	73	13	115	21

of injection are compared. This suggests that, in studies on free-living children with no history of previous diphtheria immunization, it may not be necessary to have strictly controlled groups using alternate children if the children having less than 0.001 unit of antitoxin are used and if the diphtheria environments are similar. Since the results with the two groups are similar, they are combined in the rest of the paper to simplify presentation.

The antitoxic response of all children having less than 0.001 unit of antitoxin per ml. of circulating serum at the time of the first immunizing injection is given in Table 5. The response is analyzed at three different antitoxin levels; that is, in terms of the number and percentage of children developing 0.001 unit or more, 0.01 unit or more, or 0.1 unit or more of antitoxin per ml. of circulating serum.

The results in Table 5 indicate that:

1. Under the conditions of this study, two injections of alum-precipitated toxoid or three injections of fluid toxoid at 3 week intervals cause the highest and consequently the most lasting antitoxic response.

2. One injection of alum-precipitated toxoid is superior to 2 injections of fluid toxoid.

3. The immunizing procedure which raises the most children from no detectable antitoxin to a detectable level also raises the most children to higher antitoxin levels.

4. Some antitoxin response may be under way within 10 days of an injection of either alum-precipitated or fluid toxoid. This is in accord with the observations of Jensen.[4]

Table 5 reëmphasizes the increased antigenic efficiency conferred by the alum-precipitation of toxoid, since the average antitoxin response to a single injection of alum-precipitated toxoid is so much greater than that to either one or two injections of fluid toxoid.

Fitzgerald, et al.,[5] and Fraser and Halpern [6] observed an increase in antitoxin following injection of alum-precipitated toxoid comparable to those we are reporting. They observed a much greater response to 3 injections of fluid toxoid than we found. In an attempt to solve this discrepancy, a group of children were injected at 3 week intervals with 0.5, 0.5, and 1.0 ml. of fluid toxoid.* The resulting antitoxin response of children having less than 0.001 unit of antitoxin at the time of injection is shown in Table 6. It is evident that the results with the Fraser toxoid and dosage was comparable to

* Obtained from the Connaught Laboratories through the coöperation of Dr. Fraser.

TABLE 7

Comparison of Antitoxin Response to the Different Immunizing Procedures
(All Cases Having 0.001 Unit or More at the Time of Injection)

Immunizing Procedure	4 Months		12 Months		24 Months		36 Months		48 Months		60 Months	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1 Injection 1 ml. Fluid	Number of Cases	12	52	99	119	69	115	45	79	10	13	6	62	6	29
	Cases with 0.001 Unit or More	12 100	49 94	99 100	114 98	63 91	109 95	45 100	69 87	10 100	12 92	6 100	52 84	6 100	27 93
	Cases with 0.01 Unit or More	12 100	46 88	96 97	99 87	64 93	96 84	44 98	60 76	10 100	12 92	6 100	41 66	5 83	20 69
	Cases with 0.1 Unit or More	11 92	46 88	95 96	80 70	57 83	67 58	17 38	35 44	9 90	10 77	6 100	28 45	4 67	14 48
2 Injections 1 ml. Fluid	Number of Cases	65	39	74	115	45	62	10	13	6	62	5	29	5	29
	Cases with 0.001 Unit or More	65 100	39 100	74 100	109 95	45 100	62 100	10 100	12 92	6 100	52 84	5 100	27 93	5 100	27 93
	Cases with 0.01 Unit or More	63 97	33 85	74 100	96 84	44 98	60 97	10 100	12 92	6 100	41 66	5 100	20 69	5 100	20 69
	Cases with 0.1 Unit or More	59 91	30 77	71 96	67 58	17 38	35 56	9 90	10 77	6 100	28 45	5 100	14 48	5 100	14 48
3 Injections 1 ml. Fluid	Number of Cases	104	52	99	119	69	79	10	13	6	62	6	29	6	29
	Cases with 0.001 Unit or More	104 100	49 94	99 100	114 98	63 91	69 87	10 100	12 92	6 100	52 84	6 100	27 93	6 100	27 93
	Cases with 0.01 Unit or More	104 100	46 88	96 97	99 87	64 93	60 76	10 100	12 92	6 100	41 66	6 100	20 69	6 100	20 69
	Cases with 0.1 Unit or More	100 96	46 88	95 96	80 70	57 83	35 44	9 90	10 77	6 100	28 45	6 100	14 48	6 100	14 48
1 Injection 1 ml. A. P.	Number of Cases	116	39	74	115	45	62	10	13	6	62	5	29	5	29
	Cases with 0.001 Unit or More	114 98	39 100	74 100	109 95	45 100	62 100	10 100	12 92	6 100	52 84	5 100	27 93	5 100	27 93
	Cases with 0.01 Unit or More	99 87	33 85	74 100	96 84	44 98	60 97	10 100	12 92	6 100	41 66	5 100	20 69	5 100	20 69
	Cases with 0.1 Unit or More	92 79	30 77	71 96	67 58	17 38	35 56	9 90	10 77	6 100	28 45	5 100	14 48	5 100	14 48
2 Injections 1 ml. A. P.	Number of Cases	71	39	74	115	45	62	10	13	6	62	5	29	5	29
	Cases with 0.001 Unit or More	70 99	39 100	74 100	109 95	45 100	62 100	10 100	12 92	6 100	52 84	5 100	27 93	5 100	27 93
	Cases with 0.01 Unit or More	70 99	33 85	74 100	96 84	44 98	60 97	10 100	12 92	6 100	41 66	5 100	20 69	5 100	20 69
	Cases with 0.1 Unit or More	65 92	30 77	71 96	67 58	17 38	35 56	9 90	10 77	6 100	28 45	5 100	14 48	5 100	14 48

that obtained in the rest of the study with fluid toxoid in three 1 ml. doses at 8 week intervals. We again did not obtain the high antitoxic response observed by the Canadian workers. We are unable to explain the discrepancy.

The response to the different immunizing procedures of all children having 0.001 unit or more at the time of injection is analyzed in Table 7.

As was to be expected, the response of these children to all immunizing procedures was excellent. There is a suggestion that fluid toxoid is more effective than alum-precipitated toxoid in boosting the antitoxin level where detectable circulating antitoxin already exists. This is only of academic interest, since the immunizing of the non-immune is the important problem. The actuality of this difference could not be gauged unless the results were analyzed on the basis of the amount of antitoxin present at the time of the first injection. Table 8 gives a comparison of the response of those children having 0.001 to 0.04 units of antitoxin at the time of injection.

Although the numbers are of necessity small, Table 8 does carry the same suggestion as Table 7 that fluid toxoid causes a better response than alum-precipitated toxoid when antitoxin is already present in a detectable amount. It is also interesting to note that even when 0.001 to 0.004 unit of antitoxin is present, three doses of fluid toxoid cause a better response than two, and two doses of alum-precipitated toxoid cause a better response than one.

It can be seen that there is little difference in the response of the different age groups to the immunization procedure used. It is important to know that the response of the preschool group is as good as any other, since this is the most important group to immunize from the standpoint of lowering the diphtheria mortality rate. Blum [7] likewise found the response of children in the age group 2–4 to be excellent following tetanus antitoxin immunization, but reported that those in the age group 1–2 gave a lower response.

There were no reactions of an allergic nature. From a total of 1,614 injections of alum-precipitated toxoid, two definite abscesses (both sterile) and two reactions suspicious for abscesses were observed. Three of these were in children having less than 0.001 unit of antitoxin and in one having 0.1 unit of antitoxin at the time of the first alum-precipitated injection. We attribute these to technic.

TABLE 8

Response of Children Having 0.001 to <0.004 Units at Time of Injection

Immunizing Procedure		4 Months		1 Year		2 Years		3 Years		4 Years	
		Number of Cases	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.1 Unit or More
2 Injections	No.	1313	1210	1212	7 7	1111	3 5	9 9	5 5	4 4	2 2
1 Intra Fluid	%	....	2277	....	5558	....	4946	....	5656	....	5050
3 Injections	No.	2222	1919	2523	2020	1818	1616	1010	9 9	....	....
1 Intra Fluid	%	....	8686	....	8585	....	8889	....	9090	....	....
1 Injection	No.	2727	1313	3030	1010	2222	9 6	2424	2 2	2020	1 1
1 Intra A.P.	%	....	4848	....	3333	....	4319	....	8 8	....	5 5
2 Injections	No.	2616	2414	2424	2020	2525	2020	2020	2 7	....	....
1 Intra A.P.	%	....	9585	....	8282	....	8067	....	7070	....	....

TABLE 7

Comparison of Antitoxin Response to the Different Immunizing Procedures
(All Cases Having 0.001 Unit or More at the Time of Injection)

Immunizing Procedure		4 Months				12 Months				24 Months				36 Months				48 Months				60 Months			
		Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Cases with 0.1 Unit or More
1 Injection	No.	12	12	12	12	12	11	11	11	11	9	9	9	3	2	2	2	1	1	1	1	..	..	..	..
1 ml. Fluid	%	..	100	100	100	..	92	92	92	..	82	82	82	..	..	..	..	..	..	..	..	..	..	..	..
2 Injections	No.	65	65	63	59	52	49	46	46	39	35	33	30	28	27	25	24	13	12	12	10	..	..	..	..
1 ml. Fluid	%	..	100	97	91	..	94	88	88	..	90	85	77	..	96	89	86	..	92	92	77	..	..	..	..
3 Injections	No.	104	104	104	100	99	99	98	95	74	74	74	71	27	27	27	26	6	6	6	6	..	..	..	..
1 ml. Fluid	%	..	100	100	96	..	100	99	96	..	100	100	96	..	100	100	96	..	..	..	..	..	..	..	..
1 Injection	No.	126	124	116	97	119	114	99	80	115	109	96	67	79	69	60	35	62	52	41	28	29	27	20	14
1 ml. A. P.	%	..	98	92	77	..	98	83	70	..	95	84	58	..	87	76	44	..	84	66	45	..	93	69	48
2 Injections	No.	71	70	70	65	66	65	64	57	45	45	44	37	30	30	29	25	..	..	..	..	..	..	..	..
1 ml. A. P.	%	..	99	99	92	..	99	97	86	..	100	98	82	..	100	97	83	..	..	..	..	..	..	..	..

that obtained in the rest of the study with fluid toxoid in three 1 ml. doses at 3 week intervals. We again did not obtain the high antitoxic response observed by the Canadian workers. We are unable to explain the discrepancy.

The response to the different immunizing procedures of all children having 0.001 unit or more at the time of injection is analyzed in Table 7.

As was to be expected, the response of these children to all immunizing procedures was excellent. There is a suggestion that fluid toxoid is more effective than alum-precipitated toxoid in boosting the antitoxin level where detectable circulating antitoxin already exists. This is only of academic interest, since the immunizing of the non-immune is the important problem. The actuality of this difference could not be gauged unless the results were analyzed on the basis of the amount of antitoxin present at the time of the first injection. Table 8 gives a comparison of the response of those children having 0.001 to 0.004 units of antitoxin at the time of injection.

Although the numbers are of necessity small, Table 8 does carry the same suggestion as Table 7 that fluid toxoid causes a better response than alum-precipitated toxoid when antitoxin is already present in a detectable amount. It is also interesting to note that even when 0.001 to 0.004 unit of antitoxin is present, three doses of fluid toxoid cause a better response than two, and two doses of alum-precipitated toxoid cause a better response than one.

It can be seen that there is little difference in the response of the different age groups to the immunization procedure used. It is important to know that the response of the preschool group is as good as any other, since this is the most important group to immunize from the standpoint of lowering the diphtheria mortality rate. Blum [7] likewise found the response of children in the age group 2–4 to be excellent following tetanus antitoxin immunization, but reported that those in the age group 1–2 gave a lower response.

There were no reactions of an allergic nature. From a total of 1,614 injections of alum-precipitated toxoid, two definite abscesses (both sterile) and two reactions suspicious for abscesses were observed. Three of these were in children having less than 0.001 unit of antitoxin and in one having 0.1 unit of antitoxin at the time of the first alum-precipitated injection. We attribute these to technic.

TABLE 8

Response of Children Having 0.001 to <0.004 Units at Time of Injection

		4 Months		1 Year		2 Years		3 Years		4 Years	
Immunizing Procedure		*Number of Cases*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.1 Unit or More*	*Number of Cases*	*Cases with 0.1 Unit or More*
2 Injections 1 ml. Fluid	No.	13	10	12	7	11	5	9	5	4	2
	%	..	77	..	58	..	46	..	56	..	50
3 Injections 1 ml. Fluid	No.	22	19	23	20	18	16	10	9	..	..
	%	..	86	..	88	..	89	..	90	..	..
1 Injection 1 ml. A. P.	No.	27	13	30	10	32	6	24	2	20	1
	%	..	48	..	33	..	19	..	8	..	5
2 Injections 1 ml. A. P.	No.	16	14	14	10	15	10	10	7	..	..
	%	..	88	..	82	..	67	..	70	..	..

TABLE 9

Response of Children in Different Age Groups to the Various Immunizing Procedures (All Children Having <0.001 Unit at Time of Injection)

Age Group	Immunizing Procedure		4 Months			1 Year			2 Years			3 Years		
			Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More	Number of Cases	Cases with 0.001 Unit or More	Cases with 0.01 Unit or More
Under 2 Years	3 Injections 1 ml. Fluid	No.	3	3	3	2	2	2	2	2	2	..	..	..
		%	..	..	..	..	..	..	..	..	..	..	..	..
	1 Injection 1 ml. A. P.	No.	1	1	1	1	1	1	..	..	..	..	..	..
		%	..	..	..	..	..	..	..	..	..	..	..	..
	2 Injections 1 ml. A. P.	No.	3	3	3	4	4	4	4	4	4	..	..	..
		%	..	..	..	..	..	..	..	..	..	..	..	..
2 to 5 Years	3 Injections 1 ml. Fluid	No.	118	114	82	121	116	89	67	62	46	28	27	20
		%	..	97	69	..	96	74	..	93	69	..	96	71
	1 Injection 1 ml. A. P.	No.	54	51	38	57	53	36	69	66	35	53	44	10
		%	..	94	70	..	93	63	..	96	51	..	83	19
	2 Injections 1 ml. A. P.	No.	68	67	67	63	63	58	67	67	62	..	..	..
		%	..	100	99	..	100	92	..	100	93	..	..	..
6 to 10 Years	3 Injections 1 ml. Fluid	No.	328	314	236	324	305	206	247	221	143	122	117	67
		%	..	96	72	..	94	64	..	89	58	..	96	55
	1 Injection 1 ml. A. P.	No.	206	199	123	205	192	109	214	191	84	209	179	68
		%	..	97	60	..	94	53	..	89	39	..	86	32
	2 Injections 1 ml. A. P.	No.	230	230	221	218	218	204	200	199	170	..	..	..
		%	..	100	96	..	100	94	..	99	85	..	..	..
11 Years and Over	3 Injections 1 ml. Fluid	No.	55	51	43	53	49	37	43	38	27	14	12	10
		%	..	93	78	..	92	70	..	88	63	..	86	71
	1 Injection 1 ml. A. P.	No.	16	14	6	10	8	4	15	10	7	9	5	3
		%	..	87	37	..	80	40	..	67	47	..	56	33
	2 Injections 1 ml. A. P.	No.	10	10	10	12	12	12	11	11	9	..	..	..
		%	..	100	100	..	100	100	..	100	82	..	..	..

DISCUSSION

This study was concerned solely with the antitoxin response to different immunizing procedures. No attempt is made to prove that any one procedure is the procedure of choice for routine immunization against diphtheria, for two reasons:

1. The ultimate basis for the evaluation of any immunization method is whether or not it protects against diphtheria, and not necessarily whether or not it confers Schick negativity or raises the antitoxin level to any definite point.

2. It is entirely possible that a procedure which results in a lower level of antitoxin than some other may still be the method of choice from the public health standpoint; that is, it might be less expensive, be easier to administer, and confer a high enough percentage of immunity to be the most efficient use of the public health dollar in prevention of diphtheria. It may be a question of choosing between the conferring of the highest possible immunity to the individual on the one hand, and the reduction of diphtheria by conferring a lower

but sufficient level of immunity to the community as a whole on the other.

This study emphasizes the comparatively poor antitoxin response to two injections of fluid toxoid with a 3 week interval and justifies the discontinuance of this procedure for immunization against diphtheria.

This study suggests that the Schick test may be omitted in routine immunization. Certainly there is nothing to be gained by the pre-Schick test in the preschool group—and it is doubtful whether there is any reason to Schick test following two injections of alum-precipitated toxoid or three injections of fluid toxoid until the child enters school—and then, as indicated in the subsequent paper,[8] a single injection of fluid or alum-precipitated toxoid would be more logical.

SUMMARY

The antitoxin response of children to several diphtheria immunization procedures has been determined. In the decreasing order of the response they induce in children having less than 0.001 unit of antitoxin per ml. of serum at the time of injection, they are, under the conditions of our study: two doses of alum-precipitated toxoid at 3 week interval, three doses of fluid toxoid at 3 week interval, one dose of alum-precipitated toxoid, two doses of fluid toxoid at 3 week interval, and one dose fluid toxoid.

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Reimmunization Against Diphtheria of Previously Immunized Children*

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SEVERAL years ago, the Committee on Administrative Practice of the American Public Health Association suggested the reimmunization of previously immunized children as a means of maintaining a high antitoxin level and so extending immunity to diphtheria for an additional period of years.[1] In the following report, observations are made on the reimmunization of a group of 808 children who had been immunized 1 to 12 years previously.†

The objects of the study are:

1. To determine the immunity status of a group of children who previously had received immunizing injections.

2. To determine the immunizing effect of one, two, and three doses of fluid toxoid or one or two doses of alum-precipitated toxoid on previously immunized children.

3. To determine whether previously immunized children who at the time of reimmunization have no demonstrable antitoxin would respond better to a single injection than children without demonstrable antitoxin but with no history of previous immunization.

4. To determine whether the reactions from reimmunization with fluid or alum-precipitated toxoid were severe enough to discourage the practice of reimmunization.

Blood antitoxin titration tests instead of Schick tests were used to determine the immunity status and the immunological response.

The details of methods used in immunization and titration are given in a previous paper.[2]

The entire group consisted of 808 children who had been immunized previously. The years in which they had been immunized and the number of children immunized each year are shown in Table 1.

TABLE 1

	Year of Original Immunization													
	1928	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*	*1937*	*1938*	*1939*	*1940*	*Unknown*
Number in Group	2	6	20	50	80	56	93	75	152	70	121	51	14	18

The preparations used in the original immunization were:

Toxin-antitoxin
Concentrated Toxoid
Fluid Toxoid
Toxoid with Alum Added
Alum-precipitated Toxoid

* Read at a Joint Session of the Laboratory and Epidemiology Sections of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, October 17, 1941.

† Throughout the paper, the terms "immunization" and "reimmunization" have been used to mean "the primary giving of antigenic stimulation" and "the secondary stimulation after a lapse of several years" respectively. This was done to simplify the presentation. It is realized that all injected children are not necessarily immunized.

TABLE 2

Antitoxin Titer Levels at the Time of Reimmunization, and the Reimmunizing Agent Used

Antitoxin Titer at Time of Reimmunization	*Total Number*	*Number Reimmunized with*	
		Alum-Precipitated Toxoid	*Fluid Toxoid*
Less than 0.001 unit per ml.	432	265	167
More than 0.001 unit per ml.	376	197	179

TABLE 3

Age Groups at Time of First Immunization

Age (Years)	Under 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Unknown
Per cent	3	3	5	8	7	15	26	16	8	5	2	0.9	0.4	..	0.1	2.6

As will be shown later, the results of reimmunization were uniformly good. It follows therefore that the nature of the primary immunization has little effect upon reimmunization response. For this reason the analysis of the reimmunization response has been made without reference to the original immunization preparation or procedure.

A few of the children had received Schick tests soon after their primary immunization treatment. Changes in the immunity of these individuals were noted by comparing the results of the Schick tests made soon after the original immunization with blood titration tests made at the time of reimmunization.

Out of the total of 808 children who had been previously immunized (this total includes both those with and without Schick tests), there were 432 or 53 per cent who had less than 0.001 unit of antitoxin per ml. of serum in their circulating blood at the time of the reimmunization injections, leaving the balance of 376 with 0.001 unit or more.

Table 2 shows the antitoxin levels at the time of reimmunization and the reimmunizing agent given.

Table 3 indicates the age of children at the time of the first immunization. It shows the majority as being 5, 6, and 7 years old.

Eight hundred and eight children were reimmunized as follows:

Fluid		*Alum-Precipitated Toxoid*	
1 Injection:	0.1 ml.	1 Injection:	0.1 ml.
	0.5 ml.		0.5 ml.
	1.0 ml.		1.0 ml.
2 Injections:	1.0 ml. at 3 week intervals	2 Injections:	1.0 ml. at 3 week intervals
3 Injections:	1.0 ml. at 3 week intervals		

Table 4 indicates the age of children at the time of reimmunization. It shows the majority as being from 7 to 11 years old.

A comparison of antitoxin response to different immunization procedures is made in Tables 5–8. Table 5 represents a group of individuals who originally had *less than* 0.001 unit of antitoxin at the time of reimmunization. Table 6 shows a comparison of reimmunization response to a single dose of fluid and a single dose of alum-precipitated toxoid, all children having *less than* 0.001 unit at the time of reimmunization. Table 7 represents a group which had 0.001 unit

TABLE 4

Age Groups at Time of Reimmunization

Age (Years)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Number Given A. P. Toxoid	..	..	..	3	11	26	55	53	65	78	57	43	26	27	8	7	..
Number Given Fluid Toxoid	..	..	..	1	14	17	29	30	47	68	52	26	33	18	10	..	1

TABLE 5

Comparison of Antitoxin Response to the Different Reimmunizing Procedures (432 Children)
(All Cases Having < 0.001 Unit at the Time of Injection)

Reimmunizing Procedure	More than		4 Months			1 Year			2 Years			3 Years			4 Years			5 Years		
		No. of Cases	Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less	No. of Cases	Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less	No. of Cases	Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less	No. of Cases	Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less	No. of Cases	Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less
1 Injection 1/10 ml. Fl.	No.	12	9	6	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	75	50	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection ½ ml. Fl.	No.	99	89	85	55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	90	86	55	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection 1 ml. Fl.	No.	11	7	6	1	12	9	7	2	3	2	1	0	3	2	1	0	1	1	1	0	..
	%	..	64	54	9	..	75	58	17	..	..	..	..	..	..	..	..	..	..	..	..	..
2 Injections 1 ml. Fl.	No.	14	14	13	10	12	12	11	8	6	6	6	2	7	7	6	2	4	4	3	1	..
	%	..	100	94	71	..	100	92	67	..	..	..	..	..	..	..	..	..	..	..	..	..
3 Injections 1 ml. Fl.	No.	30	30	28	22	30	30	28	16	21	21	20	11	5	5	4	3	..	..	..	..	..
	%	..	100	93	73	..	100	93	53	..	100	95	52	..	..	..	..	..	..	..	..	..
1 Injection 1/10 ml. A.P.	No.	43	43	43	25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	100	100	58	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection ½ ml. A.P.	No.	136	131	125	90	15	15	14	8	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	95	92	66	..	100	93	53	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection 1 ml. A. P.	No.	49	48	43	30	49	48	40	16	36	32	24	4	31	28	16	4	30	26	16	2	20
	%	..	98	88	61	..	98	82	33	..	89	67	11	..	90	52	13	..	87	53	7	..
2 Injections 1 ml. A. P.	No.	24	24	23	16	23	23	20	6	20	20	15	5	13	13	9	2	..	..	..	..	..
	%	..	100	96	67	..	100	87	26	..	100	75	25	..	100	69	15	..	..	..	..	..

Reimmunizing Procedure	More than	5 Years	
		Cases with 0.001 or less	Cases with 0.01 or less	Cases with 0.1 or less
1 Injection 1/10 ml. Fl.	No.	..	..	..	..
	%	..	..	..	..
1 Injection ½ ml. Fl.	No.	..	..	..	..
	%	..	..	..	..
1 Injection 1 ml. Fl.	No.	..	..	..	..
	%	..	..	..	..
2 Injections 1 ml. Fl.	No.	..	..	..	..
	%	..	..	..	..
3 Injections 1 ml. Fl.	No.	..	..	..	..
	%	..	..	..	..
1 Injection 1/10 ml. A.P.	No.	..	..	..	..
	%	..	..	..	..
1 Injection ½ ml. A.P.	No.	..	..	..	..
	%	..	..	..	..
1 Injection 1 ml. A. P.	No.	20	16	9	1
	%	..	80	45	5
2 Injections 1 ml. A. P.	No.	..	..	..	..
	%	..	..	..	..

TABLE 6

Summary of the Comparative Reimmunization Response 4 Months After a Single Injection of Fluid or Alum-Precipitated Toxoid (All Children Having Less than 0.001 Unit of Antitoxin at Time of Reimmunization)

Immunizing Procedure	Total Number of Children	Antitoxin Titer: 0.001 Unit or > per ml. per cent	Antitoxin Titer: 0.01 Unit or > per ml. per cent	Antitoxin Titer: 0.1 Unit or > per ml. per cent
0.1 ml., 0.5 ml., or 1.0 ml. Fluid Toxoid	122	86	79	48
0.1 ml., 0.5 ml., or 1.0 ml. A. P. Toxoid	228	97	94	64

or more of antitoxin at the time of reimmunization.

As shown in Table 5, observations were made on 432 children having less than 0.001 unit of antitoxin at the time of reimmunization. It can be seen that as little as 0.1 ml. of either fluid or alum-precipitated toxoid produced a significant antigenic response in previously immunized children. The results seem to indicate that either 0.1, 0.5, or 1.0 ml. of fluid toxoid, or else 0.1, 0.5, or 1.0 ml. of alum-precipitated toxoid confers a satisfactory immunity in the majority of previously immunized children. It is also evident that, no matter which immunization procedure was used and no matter what level of antitoxin was achieved, there was always a gradual loss of antitoxin titer with time. In this respect, the results in the reimmunized children parallel the observations made in our study on primary immunization.[2]

In Table 6, the results from Table 5 showing the response to a single injection of fluid or alum-precipitated toxoid are combined to give a direct comparison between the two antigens. It can be seen that the response to a single injection of alum-precipitated toxoid is slightly better than that to fluid toxoid.

As shown in Table 7, there were 376 children who, at the time of reimmunization, had more than 0.001 unit of antitoxin. This group, as was to be expected, achieved a higher average level of antitoxin than the group of children with less than 0.001 unit of antitoxin. Here again the level of antitoxin achieved 4 months after reimmunization gradually fell with time.

Table 8 shows the comparison between a previously immunized and a non-immunized group of children after receiving 1 ml. of fluid toxoid or alum-precipitated toxoid. Both groups had less than 0.001 unit of antitoxin at the time of injection.

It is evident from the study of Table 8 that, although neither group has as much as 0.001 unit of antitoxin per ml. of circulating blood, the previously immunized group was much more responsive to a specific antigenic stimulus. This is in accord with the observations of Dudley, May, and O'Flynn [1] who found that, in subjects known at some time to have been Schick negative, when clinical infection developed, it was followed by a rapid and high increase in antitoxin—a response absent in those not known ever to have acquired Schick immunity.

Table 9 summarizes the response of all children reimmunized with a single injection of fluid or alum-precipitated toxoid. It is evident that, on reimmunization of a group of which 53 per cent had less than 0.001 unit of antitoxin, there is a high degree of response following injection of fluid or alum-precipitated toxoid. The injection of alum toxoid resulted in a slightly higher percentage of response than did fluid toxoid. The results also suggest the advisability of giving children entering school a single injection of fluid or alum-precipitated toxoid without first performing a Schick test.

TABLE 7

Antitoxin Response to the Different Reimmunizing Procedures (376 Children)
(All Cases Having > 0.001 Unit at the Time of Injection)

Reimmunizing Procedure		4 Months				1 Year				2 Years				3 Years				4 Years				5 Years			
		No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >	No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >	No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >	No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >	No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >	No. of Cases	Cases with 0.001 or >	Cases with 0.01 or >	Cases with 0.1 or >
1 Injection 1/10 ml. Fl.	No.	9	9	9	7	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection ½ ml. Fl.	No.	94	93	91	88	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	99	97	94	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection 1 ml. Fl.	No.	14	14	14	14	10	10	10	9	5	5	5	3	3	3	3	1	1	1	1	0	..	..	..	..
	%	..	100	100	100	..	100	100	90	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2 Injections 1 ml. Fl.	No.	17	17	17	17	21	21	21	18	20	20	20	16	14	14	14	12	3	3	3	1	..	..	..	..
	%	..	100	100	100	..	100	100	86	..	100	100	80	..	100	100	86	..	..	..	..	..	..	..	..
3 Injections 1 ml. Fl.	No.	35	35	35	34	33	33	32	32	27	26	26	26	10	9	9	9	2	1	1	1	..	..	..	..
	%	..	100	100	97	..	100	97	97	..	99	96	96	..	90	90	90	..	..	..	..	..	..	..	..
1 Injection 1/10 ml. A. P.	No.	10	10	10	8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	100	100	80	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection ½ ml. A. P.	No.	109	108	108	104	12	12	12	12	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	%	..	99	99	95	..	100	100	100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection 1 ml. A. P.	No.	57	57	57	56	49	49	49	45	38	38	38	30	34	34	34	23	23	23	22	14	15	15	13	10
	%	..	100	100	98	..	100	100	92	..	100	100	79	..	100	100	68	..	100	96	61	..	100	87	67
2 Injections 1 ml. A. P.	No.	21	21	21	21	20	20	20	20	17	17	17	15	8	8	8	7	..	..	..	..	..	..	..	..
	%	..	100	100	100	..	100	100	100	..	100	100	88	..	..	..	..	..	..	..	..	..	..	..	..

TABLE 8

Comparison of the Antitoxin Response in a Previously Immunized and in a Non-immunized Group of Children After Receiving Fluid and Alum-Precipitated Toxoid

(All Cases Having > 0.001 Unit of Antitoxin at Time of Reimmunization)

Reimmunizing Procedure	= More <	4 Months				1 Year				2 Years				3 Years				4 Years				5 Years			
		No. of Cases	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*	*No. of Cases*	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*	*No. of Cases*	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*	*No. of Cases*	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*	*No. of Cases*	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*	*No. of Cases*	*Cases with 0.001 or <*	*Cases with 0.01 or <*	*Cases with 0.1 or <*
1 Injection 1 ml. Fl. Toxoid Previously Immunized	No.	11	7	6	1	12	9	7	2	3	2	1	0	3	2	1	0	1	1	1	0	..	..	..	..
	%	..	64	54	9	..	75	58	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1 Injection 1 ml. Fl. Toxoid Not Previously Immunized	No.	39	31	3	1	39	35	3	0	34	31	1	0	25	22	1	1	8	7	0	0	..	..	..	..
	%	..	79	8	3	..	90	8	0	..	91	3	0	..	88	4	4	..	88	0	0	..	..	..	..
1 Injection 1 ml. A.P. Toxoid Previously Immunized	No.	49	48	43	30	49	48	40	16	36	32	24	4	31	28	21	4	30	26	18	2	20	16	12	1
	%	..	98	88	61	..	98	82	33	..	89	67	11	..	90	68	13	..	87	60	7	..	80	60	5
1 ml. A.P. Toxoid 1 Injection Not Previously Immunized	No.	345	322	194	48	342	298	157	25	369	297	126	22	359	256	92	18	297	199	66	15	114	76	25	6
	%	..	93	56	14	..	89	46	7	..	80	34	6	..	71	26	5	..	67	22	5	..	67	22	5

TABLE 9

Comparison of Antitoxic Response 4 Months After a Single Reimmunizing Injection of Either Fluid or Alum-Precipitated Toxoid (Including All Children Regardless of Antitoxin Titer at Time of Reimmunization)

Immunizing Procedure	Total No. of Children	Antitoxin Titer: 0.001 Unit or > per ml. Per cent	0.01 Unit or > per ml. Per cent	0.1 Unit or > per ml. Per cent
0.1 ml., 0.5 ml., or 1.0 ml. Fluid Toxoid	239	92	90	70
0.1 ml., 0.5 ml., or 1.0 ml. A.P. Toxoid	404	98	96	78

Table 10 compares the antitoxin response to reimmunization of children who received their primary immunization more than 4 years previously with those who were injected within 4 years. The results do not suggest any loss or gain in response within the time limits studied, regardless of whether or not the children had detectable antitoxin immunity remaining. The results with those reimmunized within 4 years also confirms the feasibility of the reimmunization at school age of children originally injected in the first or second year of life.

Table 11 emphasizes the quickness of the response of children previously immunized. The comparative slowness in response of children not previously immunized is apparent.

TABLE 10

Comparison of Antitoxic Response Between Children Reimmunized within 4 Years and Children Reimmunized More Than 4 Years After Primary Immunization, All Children Receiving a Single Injection of 0.5 ml. or 1.0 ml. of Alum-Precipitated Toxoid for Reimmunization

Antitoxin Titer at Time of Reimmunization	Total Number of Children	Time Between Primary and Reimmunization	Antitoxin Titer 4 Mos. After Reimmunization: 0.001 Unit or > per ml. Per cent	0.01 Unit or > per ml. Per cent	0.1 Unit or > per ml. Per cent
0.001 Unit or > per ml.	171	Less than 4 yrs.	98	98	95
		4 Yrs. or more	100	100	98
Less than 0.001 Unit per ml.	183	Less than 4 yrs.	95	91	66
		4 Yrs. or more	97	89	61

TABLE 11

Comparison of Antitoxic Response at the End of 10 Days to a Single Injection of Fluid or Alum-Precipitated Toxoid

History	Reimmunization	Antitoxin Level at Reimmunization	Total Number of Children	Antitoxin Titer 10 Days After Reimmunization: Less Than 0.001 Per cent	0.001 or More Per cent	0.01 or More Per cent	0.1 or More Per cent
No Previous Immunization	1 Inj. Fl. Toxoid	Less than 0.001	130	88	12	8	4
	1 Inj. A.P. Toxoid	Less than 0.001	87	76	24	17	16
Previously Immunized	1 Inj. Fl. Toxoid	Less than 0.001	5	0	100	100	80
	1 Inj. A.P. Toxoid	Less than 0.001	7	0	100	100	71
	1 Inj. Fl. Toxoid	0.001 or more	10	0	100	100	90
	1 Inj. A.P. Toxoid	0.001 or more	11	0	100	100	100

TABLE 12

Comparison of Reactions Following Reimmunization with 0.1 ml. or 0.5 ml. of Fluid or Alum-Precipitated Toxoid

Injection	Total Number in Group	Reactions			
		Mild	Moderate	Severe	General
		Per cent	Per cent	Per cent	Per cent
0.1 ml. Fl. Toxoid	22	36	0	0	0
0.1 ml. A.P. Toxoid	57	58	2	0	..
0.5 ml. Fl. Toxoid	234	26	8	1	3
0.5 ml. A.P.Toxoid	240	37	14	7	3

Mild Reaction—Local tenderness detectable on pressure, small area of redness
Moderate Reaction—Local tenderness, slight pain on using arm, large area of redness
Severe Reaction—Arm so painful arm not used
General Reaction—Fever and malaise

It was believed very important to determine whether it is safe to reimmunize children. Fraser [2] has pointed out as a theoretical objection that the giving of doses of alum-precipitated toxoid at long and irregular intervals might possibly result in anaphylactic reactions. In this connection, it was observed that, in the entire group of 808 children, there were no general allergic reactions. It is important to remember that all possible sequences of fluid and alum-precipitated toxoid for primary immunizations and reimmunizations were used.

Table 12 shows that alum-precipitated toxoid produces a higher percentage of local reactions than fluid toxoid. However, as can be seen from this table, general reactions were infrequent following the use of either preparation.

SUMMARY

This study was undertaken to determine the reimmunization response of a group of children who had been immunized previously. It is apparent from observations made on 808 children, some of whom were followed for a period of 5 years after reimmunization:

1. That diphtheria antitoxin immunity, regardless of the immunizing procedure, is not permanent, and that, as time goes on, the antitoxin content of the blood is reduced. It is apparent that progressive reduction of antitoxin content, though slow, is very definite. This has been pointed out by other workers.[3, 4]

2. That reimmunization with fluid toxoid or alum-precipitated toxoid is highly effective, and one small dose produces a response in a satisfactory proportion of children.

3. That no general allergic reactions were observed in the entire group, and the percentage of local reactions was not severe enough to discourage reimmunization.

4. That the previously immunized children who had lost all demonstrable antitoxin responded much better to a single injection than children not previously immunized and without demonstrable antitoxin.

5. That reimmunization of children 5 or 6 years after immunization in infancy would maintain the blood antitoxin at a good average level.

6. That alum-precipitated toxoid is somewhat superior to fluid toxoid as a reimmunizing agent, although its comparative effectiveness as an agent for primary immunization is much more striking.

Therefore, the procedure recommended by the Committee on Administrative Practice of the American Public Health Association, consisting of immunization in early childhood and reimmunization upon entering school, is practical. Widespread use of such a procedure should approach complete eradication of diphtheria.

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Properties of Strains of Corynebacterium diphtheriae Obtained from Various Parts of the United States*

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IN 1933, the writer and his collaborators, working in the Eastern Health District Laboratory at The Johns Hopkins School of Hygiene and Public Health, in coöperation with the Baltimore City Health Department, undertook a series of investigations of diphtheria carriers, for the purpose of comparing the carrier rate among Baltimore school children at that time with the rate obtained by Doull and Fales and their associates in the same city and, for the most part, in the same schools, in 1921–1924.[1]

At the time these studies were being organized, the prevalence of the newly described[2] gravis type of *Corynebacterium diphtheriae*, and its relation to severe and fatal diphtheria, as observed in England and Central Europe, were being discussed in all parts of the world. Little or nothing was known concerning the organism in the United States and, as a result, data were in demand regarding its distribution and epidemiological potentialities in this country. For this reason, in 1936, the Subcommittee on Diphtheria of the American Public Health Association, with the assistance of funds from the W. K. Kellogg Foundation, coöperated with the Baltimore group, including the Department of Bacteriology of The Johns Hopkins School of Hygiene and Public Health, and the carrier studies originally planned on a local basis were broadened to include surveys of widely scattered portions of the country in several successive seasons. In addition, in 1940, arrangements were made, through the courtesy of the U. S. Public Health Service, to collect cultures of *C. diphtheriae* from persons ill with diphtheria in various cities from coast to coast.

METHODS

A standard method of carrying on the surveys was agreed upon and all collaborating agencies worked to maintain uniformity of field procedures and laboratory technic. Bacteriologists in areas where cultures were isolated from carriers for the purposes of the surveys were given instruction in, and practical experience with, the standard bacteriological method either in the Eastern Health District Laboratory, The Department of Bacteriology, or in their own laboratories, by the writer acting for the committee as the Referee on Bacteriological Procedures.

An accurate and comprehensive study of the cultural properties and virulence of each strain of *Corynebacterium* isolated was made in the Eastern Health

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District Laboratories or the Department of Bacteriology of The Johns Hopkins School of Hygiene and Public Health, under rigidly controlled conditions. Details of these conditions and methods have been published elsewhere.[3] Determinations of virulence, cultural characters and type (gravis, mitis, etc.), therefore, were the same for all, and conformed as closely as possible to standard procedures and to original descriptions of type. Indeed, an important by-product of these efforts was complete realization of the importance of uniformity in laboratory technic. This was summarized in the statement that " if reports upon the occurrence of gravis and mitis and intermediate types of *C. diphtheriae* in different parts of the world are to be comparable, the criteria of identification must be equivalent. The designations are not valid unless the strains under consideration have been shown to conform fairly closely to the criteria originally set up by Anderson, *et al.*, as characteristic. . . . Failure of many investigators to describe in detail the full complement of the biochemical characters of their ' gravis,' ' mitis,' and intermediate types, or the methods by which they were determined, or both, renders almost fruitless much of the work in the field." [3]

RESULTS

Some of the bacteriological results of the carrier and culture studies have already been published,[4, 5, 13] but these earlier papers, although complete at the time of publication, lacked important data which were obtained subsequently and which are briefly summarized in this final communication. The summary of all the work may be given under four heads, as follows:

1. *Culture collection*—Over the period of about 8 years during which these investigations were pursued, and with the collaboration of many persons, including physicians of the Eastern Health District and staff members and students in the Departments of Bacteriology and Epidemiology of this school, personnel of various state and city health departments, officers of the U. S. Public Health Service, and several bacteriologists in England, there has accumulated in Baltimore a unique collection of over 2,000 strains of corynebacteria, all thoroughly documented as to biological properties and catalogued as to source.

The bacteria are maintained desiccated *in vacuo* and are, in most instances, the same identical individuals which were first isolated in pure culture, being separated from the throat of the patient or carrier only by the following steps:

1. Original cultivation on Loeffler slant directly from nose or throat
2. The above growth streaked on a plate of cystine-tellurite agar
3. Colony fished from the plate to a slant of Pai or Loeffler medium
4. The latter growth, suspended in serum or blood, preserved in vacuum desiccation jars

No culture, so preserved, has so far failed to grow readily on removal from the vacuum jars to blood-dextrose infusion broth. The practical value of this collection of cultures has already been realized by its use as a source of material for several investigations in this laboratory, as a source of type cultures for various investigators in various parts of both hemispheres, and as a source of data referred to in the following paragraphs.

2. *Technological improvements and biological data*—As the work progressed, many technical data of use in the public health laboratory were accumulated and some of the information gained has been valuable in improving methods for the isolation of *C. diphtheriae*, especially from carriers. An example is the formula for the cystine-tellurite agar mentioned above.[6, 7] The formula was

found to yield a very high percentage (98 or 99 per cent) of isolations of diphtheria bacilli from morphologically positive throat and nose cultures from cases and case-contact carriers, and to detect the diphtheria bacillus and to permit its isolation from many casual, non-case-contact carrier cultures yielding negative whole-culture virulence tests or negative microscopic diagnoses, or both. Its special value in field studies was reported by Frobisher and Van Volkenburgh in 1935.[8]

Pai's egg medium[9] which had been used to some extent in China as a substitute for Loeffler's medium was thoroughly tested, in a somewhat simplified form, during these studies. The modified "Pai's egg medium, containing no serum, was found to give as reliable results as Loeffler's medium with respect to both morphology and virulence, and to be much simpler to prepare; an important consideration to laboratories so situated that the preparation of complicated medium is impracticable or where the obtaining and storing of serum is a matter of expense or difficulty. Many small laboratories engaged in public health bacteriology encounter such difficulties."[6] Subsequent statistical studies[10] suggested that the egg medium may sometimes fail to yield expected numbers of *avirulent* strains of *C. diphtheriae* when used for initial cultures from the nose and throat, although there is no difficulty in the isolation of *virulent* strains. This matter deserves further investigation.

A considerable study of the physiological properties of *C. diphtheriae* was also made "with the hope of discovering some . . . property which might be of use in distinguishing between different groups of strains within the species limitations of *C. diphtheriae*. About 150 virulent and avirulent cultures from carriers, cases, and case contacts, including gravis, mitis and intermediate strains, were subjected to tests for their power to hydrolyze a variety of substances including carbohydrates, proteins, glucosides, organic acids, etc., as well as for a number of other properties. . . . While our knowledge concerning a variety of biochemical properties of *C. diphtheriae* was increased by the work performed, no correlations which might be of use in establishing groups within the species of *C. diphtheriae* were brought to light."[11]

3. *Results of carrier surveys, determination of gravis and mitis types, etc.*—The case and carrier studies carried out after 1936, in the country as a whole, yielded data which have proved of interest because, in addition to complementing, in this hemisphere, many surveys made in England, Europe, and other parts of the world, they are the first large-scale data on this subject obtained in the United States. In the interest of brevity, the principal findings may be grouped under three subheadings as follows:

a. *Geographical distribution of certain types of diphtheria bacilli*—Several facts concerning the geographical distribution of diphtheria bacilli were cited in earlier studies, and additional pertinent data collected in the last year are given in this report. Marked differences in types prevalent in certain regions are exemplified by the results of surveys carried on in Alabama and New York State. In 1938–1939, 45 per cent of 104 cultures from Alabama were gravis or gravis-like, and 28 per cent of these were virulent (Table 1, Line B). Contrasting with this was the situation in Kingston, N. Y., where no virulent cultures and no gravis or gravis-like strains were found among nearly 1,800 children during the same season. Instead, 23 strains of the mitis type were isolated. None was virulent (Table 1, Line F). Data showing similar differences between groups of cultures were obtained in several other areas (*e.g.*, Saginaw, Mich., and Richmond, Va.,

TABLE 1

	Year (1)	Season (2)	Area of Survey (3)	Children Examined (4)	Strains Isolated (5)	Gravis and Gravis-like (6)		Mitis and Mitis-like (7)		Virulent (8)		Avirulent (9)	
						No.	%	No.	%	No.	%	No.	%
A	1937–38	Oct. '37–Feb. '38	Alabama (Lee, Chilton and Marshall Cos. and Birmingham City)	3,499	90	9	10	59	66	18	20	72	80
B	1938–39	Oct. '38–Dec. '38	Alabama (Randolph and Shelby Cos.)	1,800	104	47	45	37	36	29	28	75	72
C			Randolph County	900	43	7	16	29	67	19	..	..	..
D			Shelby County	900	61	44	72	8	13	10	..	..	..
E	1939–40	Spring	Alabama (Pike Co.)	950	49	0	..	45	92	2	4	47	96
F	1938	Oct. '38–Dec. '38	New York (Kingston)	1,798	23	0	..	23	100	0	..	23	100
G	1940	Jan. 8–Mar. 5	New York City (Lower East Side)	2,360	77	8	10	54	70	14	18	63	82
H	1940	Dec. 4–Dec. 18	New York City (Lower East Side)	498	33	0	..	33	100	6	18	27	82
I	1937–38	Oct. 18, '37–Feb. 28, '38	Virginia (Hanover, Prince George, Pulaski Cos.; Norfolk)	1,980	34	0	..	32	94	10	29	24	71
J	1938–39	Oct. 18, '38–Apr. 4, '39	Virginia (Arlington, Pittsylvania, Fairfax Cos.; Richmond City)	1,793	17	11	65	2	12	3	18	14	82
K	1933–37	Oct '33–June '37	Baltimore (E.H.D.)	7,721†	237‡	12	5	178	75	..	..	..	..
K[1]	1936–37	Dec. 11–Feb. 12	Baltimore (E.H.D.)	1,007	12	1	8	11*	92	11	92	1	8
L	1939	Oct. 16–Nov. 20	Baltimore (E.H.D.)	1,102	17	0	..	15	88	5	31	12	69
M	1937–38	Oct. '37–May '38	Cleveland City Schools	5,000	31	0	..	31	100	7	23	24	77
N	1938–39	Nov. '38–May '39	Cleveland City Schools		26	1	4	32	85	9	35	17	65

* Not determined for all strains isolated. This figure is therefore an approximation only.
† Exclusive of about 200 cases or contacts.
‡ Includes about 140 case and contact cultures.

Ossining, N. Y., and Kingston, N. Y.), and have already been reported.[13]

Considering the Kingston and Alabama data in the light of recent downward trends in diphtheria carrier and morbidity rates, especially in the North, the question naturally arose as to whether these findings represented a situation in which cultures from northern latitudes were largely of the avirulent and mitis types while those in the South, in general, were more commonly virulent and of the gravis type. It was found on further investigation that this was probably not the case, and that marked differences of this sort can exist in contiguous areas in the South as well as in widely separated zones North or South. For example, a slightly more detailed study of the 1938–1939 Alabama data revealed an interesting difference between two nearby counties. In Randolph County 67 per cent of 43 carrier cultures were mitis or mitis-like in character and 16 per cent were gravis and gravis-like.* The virulent carrier rate was 2.1. In Shelby County, at the same time, of 61 cultures isolated, only 13 per cent were mitis-like, and 72 per cent were gravis or gravis-like.* The virulent carrier rate was 1.0 (Table 1, Lines C and D).

More recent findings show that gravis strains are not necessarily characteristic of Alabama diphtheria carriers, nor mitis strains of the northern children. Shelby County seems to have been an exception. For example, in Alabama, in 1939–1940 in Pike County, 92 per cent of the carrier cultures were mitis-like and none was gravis-like (Table 1, Line E). Investigating a more northerly area, it was found that, of 77 cultures obtained in the Lower East Side of Manhattan, New York City, in the same fall and winter, 10 per cent were gravis-like and 70 per cent were mitis-like (Table 1, Line G).

* The remaining cultures were indeterminate in character.

These facts and similar data obtained in other areas (Cleveland, Ohio, and Baltimore, Md.), all together indicate that: (a) appreciable differences in prevalence of various kinds of diphtheria bacilli may exist concurrently in populations within a few miles of each other; while (b) similarities may exist in culture types found over wide areas; and (c) latitude may have little or nothing to do with the diphtheria flora. More extensive data are obviously needed on the ecology of the corynebacteria.

b. *Differences in prevalence of different types of diphtheria bacilli in successive seasons*—The impression was gained from the results of certain successive surveys that the flora characteristic of a population group in one season may differ considerably in a later season. In some places there was little change from year to year. Unfortunately, however, surveys made in the same area in corresponding seasons of successive years, by the same technic and persons, are exceedingly rare so that no final conclusions may be drawn concerning this matter. While the data available are of great value as bases of comparison for future surveys, they serve best at present to emphasize the desirability of further investigation in the same areas and during comparable seasons.

In Baltimore, for example, the same schools in the Eastern Health District and contiguous zones were examined in several successive years, but not always in corresponding seasons or by the same methods.[10] However, here the flora seemed fairly stable. Thus, in the years 1933–1937, 5.5 per cent of 237 cultures from cases and carriers were gravis or gravis-like. Only one or two gravis-like cultures were found in any one year. Seventy-five per cent were mitis or mitis-like.* No gravis-like strains were found among 17 cultures isolated in 1939, but 88.2 per cent were mitis-like,

the remainder indeterminate (Table 1, Lines K and L).

On the other hand, of 90 cultures obtained from carriers in Alabama in the fall and winter of 1937–1938, 59 (66 per cent) were mitis and mitis-like and 9 (10 per cent) gravis or gravis-like. The proportions differed somewhat in the winter of 1938–1939, while in the spring of 1939–1940, of 49 carrier cultures, 92 per cent were mitis or mitis-like and none was gravis-like.* The former figures are based on Lee, Chilton, and Marshall Counties, the latter on Pike County (Table 1, Lines A, B and E). In Virginia, of 34 cultures obtained from carriers during 1937–1938, none was gravis-like and 32 (94 per cent) were mitis or mitis-like.* In 1938–1939, of 17 cultures isolated during carrier surveys, 11 (65 per cent) were gravis or gravis-like and 2 (12 per cent) were mitis-like* (Table 1, Lines I and J). Here again, the areas studies in successive seasons were different. In the Lower East Side of Manhattan, New York City, during the early months of 1940, 8 (10 per cent) of 77 carrier cultures were of the gravis or gravis-like type, while 54 (70 per cent) were mitis or mitis-like. In the following December, 33 strains were isolated from 498 children, and all of them were mitis or mitis-like (Table 1, Lines G and H).

Differences in the ratio of avirulent to virulent strains or in the virulent carrier rate, or both, were observed in the data collected from year to year in some sections, but not in others. But here again, most of the differences reported are representative only of large general areas, and entire fall-winter-spring survey periods, because not exactly the same populations were examined in each season, and the surveys were not always carried on during exactly the same weeks or months of each year. The season-area data pertinent to these surveys are shown in Table 1. In Alabama, 18 of 90 cultures (20 per cent) isolated in 1937–1938 were virulent, and 29 of 104 cultures (28 per cent) were virulent in 1938–1939. Contrasting with these figures are those for the season 1939–1940, in which only 2 of 49 cultures (4 per cent) were virulent (Table 1, Lines A, B, and C, Columns 8 and 9). The same counties were not examined each season, but all were near Montgomery. The situation was different in Baltimore where, in 1939, 5 virulent cultures (31 per cent) occurred among 17 strains isolated from 1,102 children (Table 1, Line L). In the same areas, in surveys carried on during 1934–1936, 35 virulent cultures (34 per cent) had appeared among 104 isolated from 3,228 children. Similar to this situation was that in the Lower East Side of Manhattan. Here, during early 1940, of 77 cultures taken from 2,360 children, 14 (18 per cent) were virulent and, in the latter part of 1940, 6 (18 per cent) of 33 cultures obtained from 498 children were virulent (Table 1, Lines G and H, Columns 8 and 9).

Three impressions emerge with some degree of clarity from this rather confusing collection of data. First, bacteriological findings in one season are of no value in predicting the bacteriological situation in a subsequent season anywhere. Second, with respect to the seasons and areas investigated, the ratio of virulent to avirulent strains in the various population groups studied is generally static or downward.† Third, with one or two exceptions, the mitis-like types of *C. diphtheriae* seem to be generally in the majority and may be increasing in prevalence.

c. *The gravis type of C. diphtheriae in persons with clinical diphtheria, their immediate contacts, and casual carriers*

* The remaining cultures were indeterminate in character.

† This does not necessarily apply to carrier *rates*, although it does in some areas.

TABLE 2

Types of C. diphtheriae in Clinical Cases and Household Contacts, and in Casual Carriers, in Various Parts of the United States, 1939–1941

Source	Cultures	Mitis-like		Gravis-like		Indeterminate types	
		No.	%	No.	%	No.	%
Cases and contacts							
Colorado	6	6	100	0	..	0	..
Indiana	33	26	79	1	3	6	..
Kentucky	1	1	100	0	..	0	..
Maryland	26	18	69	4	15	4	..
Minnesota	16	8	50	1	6	7	..
Mississippi	4	2	50	2	50	0	..
Missouri	26	22	85	1	4	3	..
New Mexico	7	7	100	0	..	0	..
North Carolina	2	0	..	0	..	2	..
Utah	4	4	100	0	..	0	..
Virginia	33	24	73	6	18	3	..
Ohio	4	4	100	0	..	0	..
Wyoming	16	12	100	0	..	0	..
Total	178	138	77.5	15	8.4	25	14.1
Carriers							
Alabama	49	45	92	3	6	1	..
Baltimore	21	13	62	2	10	6	..
New York City	109	87	80	8	15	14	..
Utah	2	2	100	0	..	0	..
Total	181	147	81.2	13	7.1	21	11.6
Source not stated							
California	88	71	78	10	12	7	..
Ohio	5	5	100	0	..	0	..
Total	93	76	83.6	10	11	7	7.5
Grand total	452	361	80.2	38	8.4	53	11.7

in the United States—One of the major objects of this study was to obtain accurate information concerning the frequency of occurrence of the gravis and other types of *C. diphtheriae* in persons with clinical diphtheria and their immediate contacts, as well as in healthy casual carriers, in the United States as a whole. With the coöperation of many interested workers, 178 cultures of *C. diphtheriae* were obtained from clinical cases of diphtheria and from their familial or immediate contacts, during the season 1939–1941 from the places shown in Table 2. In this group of cultures, as is shown in the table, the mitis and mitis-like types were about 9 times as common as the gravis and gravis-like types. Two hundred and seventy-four other cultures were collected from carriers and miscellaneous sources during the same period from various other places in the country. In this group also the mitis and mitis-like types were greatly in the majority (10:1). All were newly isolated by various bacteriologists. In the whole collection of 452 case, carrier, and contact cultures obtained from all areas in 1939–1941, there were about 9.5 times as many mitis and mitis-like as gravis and gravis-like cultures. This is in general agreement with previous experience in Baltimore where the mitis-like strains greatly predominated, and where there was relatively little change in the situation over a period of years. It is also in agreement with recent findings in New York City where Seligmann has found the mitis, undeterminate and avirulent strains to be greatly in the majority.[17]

In the country as a whole, therefore, it seems that, except for small, local, and probably temporary concentrations

of the gravis type, such as have occurred in Alabama and Virginia, and in one small, explosive outbreak in Belair, Md., in 1936, the chance of finding a gravis or gravis-like strain of *C. diphtheriae*, as measured by the surveys of 1933–1941, has been at most not more than 1 in 9. The chance of finding a *virulent* gravis or gravis-like strain in carriers has been even smaller than this; probably no more than about 1 in 40 considering the country as a whole since, of about 180 gravis and gravis-like strains isolated since 1933 in *all* surveys, only about 45 (25 per cent) were virulent. Since these figures include gravis-*like* as well as *true* gravis* strains, the possibility of finding the latter is still less than 1 in 40, and is more likely to be 1 in 100 or more in most areas.

These observations indicate that, during the period of the surveys, in the areas covered by them, the gravis type of *C. diphtheriae* has been of little clinical significance and is not, at the time of writing this report (June, 1941) a constant or pressing problem to health officers or physicians in general in the United States. It must not be forgotten, however, that some strains of *C. diphtheriae* may be "susceptible, at times, of a tremendous exaltation of virulence, aggressiveness or dispersiveness. The enhancement of virulence (for human beings) does not seem to be manifested in the usual animal tests and may not always be accompanied by gravis cultural characters, but it seems to be found frequently in strains possessing these characters. This enhancement of virulence seems to convert them into extraordinarily dangerous parasites not (greatly) hampered by immunity as we ordinarily measure it (in human beings). Such strains were involved in the Leeds outbreak and form the basis of the original description of the gravis type of diphtheria bacillus. Therefore, *if* gravis strains are most susceptible of sudden great enhancements of virulence, their increasing prevalence in any community may constitute a potential menace."[5] A possible example of such a development may be seen in the explosive outbreaks reported in Halifax and Portsmouth, Nova Scotia, in 1940–1941. Strains kindly forwarded to the author by Dr. J. H. Mueller and Dr. E. B. Schoenbach of Harvard University have been of the gravis type.

Perhaps the United States typifies the areas "with mild epidemics and low morbidity" referred to by Seligmann: "In countries with widespread epidemics and severe outbreaks the existence of sharply differentiated types of diphtheria bacilli, often clinically in agreement with the nomenclature of the British authors, is readily confirmed. In countries with mild epidemics and low morbidity, difficulties in differentiating types are often encountered and, if types are found, they do not seem to be of any clinical significance. In such areas one observes many avirulent and atypical strains that cannot be classified as belonging to any one of the described types."[12] The latter two sentences would describe the present situation in the United States.

d. *Establishment of base-line data for future comparison*—In closing this portion of our summary, it is realized that objections may justly be raised against any definite or final conclusions of a comparative nature drawn from the present survey results because of lack of uniformity with respect to season and population groups in each area. It cannot be gainsaid, however, that these surveys provide, as indeed they were intended to do, bases for future comparative studies which are exceptionally

* *True gravis* strains are characterized by the usual properties of *C. diphtheriae* and by: fermentation of starch and glycogen; formation of large "scalloped" and irregular colonies on chocolate-tellurite agar; formation of pellicle and early alkalinity in broth; failure to produce soluble hemolysin in broth. *Gravis-like* strains may lack one or two of these properties. *Mitis* strains are generally negative or opposite in all respects.[3]

useful because of the unusual degree of uniformity of technic, completeness of record, and other important details which have obtained throughout the whole coöperative effort.

One complaint common to nearly all of the reports of the collaborating members of the Subcommittee on Diphtheria published from time to time, and especially in the Supplement to the March (1940) issue of the AMERICAN JOURNAL OF PUBLIC HEALTH,[13] has been to the effect that: "Unfortunately no data are available from previous studies of this nature for comparison with the present survey results." or "It is not known what the situation has been in previous years so that no idea of trend can be formed at present." These statements will not be necessary in the future and the committee may well feel gratified that this is so.

4. *Studies of avirulent strains*—It is the experience of most investigators that incidental observations made during the activity of a major research project have sometimes proved to be of no little interest in themselves. So, during the present group of surveys, collateral studies, especially of virulence of corynebacteria, have yielded data which seem to have considerable theoretical and practical value *per se*.

Investigations of virulence of different types of *C. diphtheriae* begun in the summer of 1940 led to the discovery that not only virulent but also the so-called avirulent strains of *C. diphtheriae** are highly lethal when injected intracerebrally into mice. This was reported briefly in 1940, and problems arising from it are still under active investigation.[14]

A point of interest in this connection, long under discussion by epidemiologists, concerns the possible rôle of these so-called avirulent strains in the maintenance of at least a part of the natural ("silent") immunity (as judged by the Schick test) found in children under 10 years of age. In some areas as many as 92 per cent of the children are naturally immune. Virulent carrier rates do not always seem adequate to the maintenance of such widely distributed natural immunity. Data have been obtained in preliminary investigations made in this laboratory, and already reported in abstract,[15] indicating that immunization with these organisms may give some protection against virulent strains, but the results are as yet merely suggestive. Detailed information may be published later.

Additional studies of virulence have revealed the fact that 7 to 14 day old chicks (unless protected with antitoxin) are highly susceptible to diphtheria toxin and to virulent cultures, and *not at all* to avirulent strains or diphtheroids, and so may serve as substitutes for guinea pigs and rabbits in routine virulence tests, or in estimations of the potency of toxins, antitoxins, etc., with the advantage that they are readily obtainable at all times from hatcheries or the laboratory incubator at a cost of 8 to 15 cents apiece.[16]

SUMMARY

1. A study of strains of *C. diphtheriae* isolated from healthy, casual carriers, persons with clinical diphtheria, and the familial or other immediate contacts of the latter, has been conducted in collaboration with national, state, and local health agencies in the United States. A large collection of pure cultures (about 2,000) representing 17 states from New York to California and Minnesota to Mississippi, has been carefully studied and described and is maintained desiccated *in vacuo* in the material in which originally isolated.

2. Investigations carried on in the laboratory concurrently with the field studies have led to several improvements in methods for isolation of *C. diphtheriae* from the throat, especially of carriers.

3. Carrier surveys have shown that any

* Organisms indistinguishable from ordinary *C. diphtheriae* except that they cannot be shown to be toxigenic by means of rabbit and guinea pig tests.

type of diphtheria bacillus, *e.g.*, gravis or mitis, virulent or avirulent, may predominate and at times may be the only type present in some communities but not in others. It was found that this phenomenon may be extremely localized or very general, and that, under present conditions in the United States, conclusions in regard to type prevalence or rates are not valid beyond the confines of a county or state, and often a town or village.

4. The data *suggest* that changes may occur from year to year in any given area in the prevalence of gravis, mitis, and other types of diphtheria bacilli, and in the ratio of virulent to avirulent and mitis to gravis strains as well as in the absolute numbers of either. However, further information is needed concerning these problems before generalizations can be made. In the meantime, descriptions of diphtheria carrier rates, types, virulence, etc., should state accurately the time as well as the area covered, in addition to the methods used in obtaining the data.

5. Many of the strains of the gravis type of *C. diphtheriae* encountered in carriers in the United States during these studies are wholly avirulent when tested by the usual methods.

6. In a group of over 175 cultures obtained from *clinical cases* of diphtheria, and their household contacts, between November, 1939, and March, 1941, in various parts of the United States, there were about 10 times as many mitis and mitis-like strains as gravis and gravis-like. About the same ratio was found among 181 *carrier* cultures obtained in 1939–1941 from Alabama, Baltimore, New York City, and Utah (11:1). Among 452 cultures obtained from all sources in 1939–1941, 361 were mitis or mitis-like, and 38 were gravis and gravis-like (a ratio of about 9.5:1).* The mitis-like type of *C. diphtheriae*, therefore, is at the time of writing (June, 1941), about 10 times as common as the gravis-like type in the United States. Since only about 1 in 10 of the latter is of the *true* gravis type, and *virulent* at the same time, probably not more than about one strain of *C. diphtheriae* in over 100 in the United States is of the *virulent and genuinely gravis* type except in a certain few, sharply localized areas where outbreaks have occurred.

7. The gravis type of *C. diphtheriae* is not an important health problem in the United States *at present*, but may become so at any time.

8. The data presented or referred to herein constitute a sound basis for future investigations on the epidemiology and bacteriology of diphtheria in the United States.

9. Studies of the virulence of organisms of the genus *Corynebacterium* showed that (a) 7 to 14 day old chicks are, in many respects, more desirable subjects for testing the virulence or toxigenicity of diphtheria bacilli, and for measuring the potency of toxin, than are guinea pigs and rabbits, and are an entirely practical substitute for these purposes, within certain limits; (b) although mice are highly resistant to virulent cultures of *C. diphtheriae* and to diphtheria toxin injected intraperitoneally or subcutaneously, they are highly susceptible to these materials injected intracerebrally; (c) not only are they susceptible to virulent cultures and to toxin, but they succumb with almost equal regularity, and exhibit exactly the same highly characteristic symptomatology when similarly injected with cultures of *C. diphtheriae* which are *avirulent* as determined by the rabbit, guinea pig, and chick tests.

* The remainder were indeterminate in type.

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Public Health Activities of the American Red Cross

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THE questions we have been asked in the months since our association with the American Red Cross have led us to the conclusion that for an organization that has functioned as long and that has been as prominently in the public view as the American Red Cross, there is a surprising lack of sound knowledge as to what its objectives are and how it operates.

It is, therefore, the purpose of this paper to review, define, and to reëmphasize the responsibility and function of the Red Cross as a public health adjunct.

Since its organization the Red Cross has included medical and health services and public health work among its major activities. The very connotation of the words "Red Cross" brings up the idea of services of health and welfare.

Most of us can agree that the protection of the public health is a function of government. Likewise we can agree that voluntary health agencies should continue to exert their efforts toward supplementing and supporting the work of these official agencies. In this understanding of function and relationships the Red Cross makes a significant contribution to the national welfare by its educational and service efforts in the field of public health.

Being semi-official, non-political, and non-partisan, with an emblem known everywhere, a prestige gained from accomplishment in doing the job and 3,743 local Chapters in the United States, the Red Cross will continue to make these contributions, in peace and in war, to improve the public health and welfare.

The activities of the Red Cross in foreign service, in disaster relief, and in public health nursing are well known. Its instruction courses in First Aid, Water Safety, Accident Prevention, Home Nursing, and Nutrition have furnished leadership which has improved and extended what the official agencies have today. Broadly speaking, all services of the Red Cross have health and welfare significance, but the activities of some are so pertinent to our present defense and war efforts that some detail is indicated.

DISASTER RELIEF

For purposes of definition, a disaster is a situation, usually catastrophic in character, in which numbers of people are suddenly plunged into helplessness and suffering.

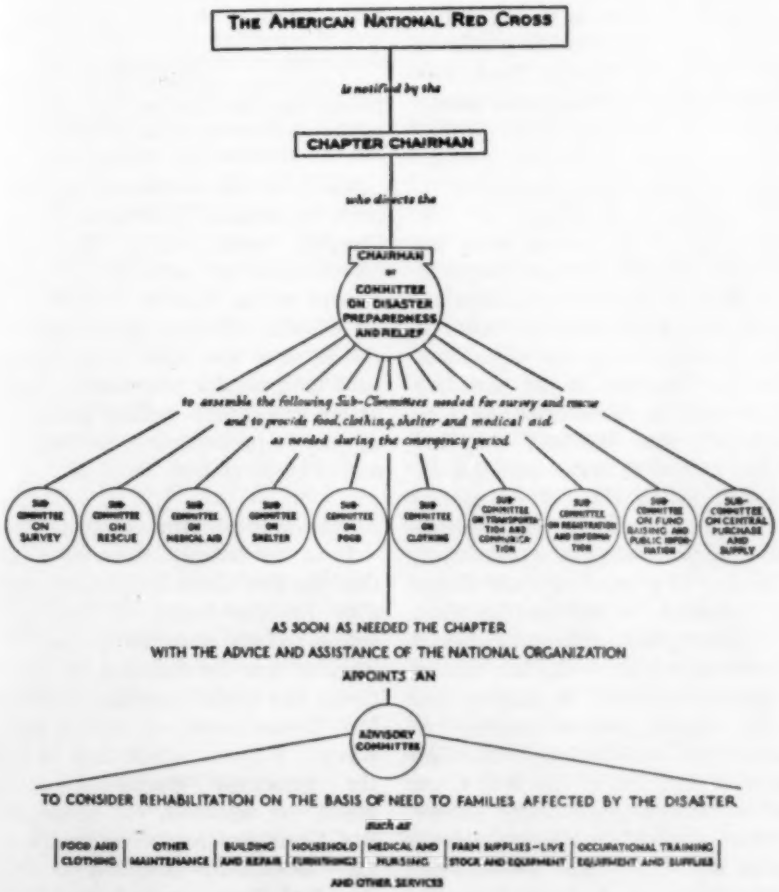
The immediate objective behind disaster aid is that of meeting emergency needs, be they medical and surgical—or food, shelter, clothing, and the replacement of household goods and property. The ultimate objective is to assist

the victims of such catastrophies in taking up life where they left off when the disaster struck. The Red Cross does not replace all losses caused by disasters—since some of these losses occur among those who are self sustaining through reserve funds, insurance, or through available community facilities. It does attempt to meet immediate needs and rehabilitate those who, because of the disaster, would be destitute. With this program it supplements, does not duplicate, the public and private resources of the community.

The Disaster Relief Service operates through its national staff and through the facilities of its local Chapters, utilizing their welfare, health, and other services. In this service the Red Cross clearly defines its relationship to existing medical and public health agencies.

The American Red Cross recognizes that the primary responsibility for the care of the sick and injured in disasters rests with the local physicians. Red Cross medical service in Disaster Relief does not substitute for the services of local physicians and dentists, but coöp-

When Disaster Strikes*


THE AMERICAN NATIONAL RED CROSS
is notified by the
CHAPTER CHAIRMAN
who directs the
CHAIRMAN
or
COMMITTEE ON DISASTER PREPAREDNESS AND RELIEF
to assemble the following Sub-Committees needed for survey and rescue and to provide food, clothing, shelter and medical aid as needed during the emergency period.
SUB-COMMITTEE ON SURVEY
SUB-COMMITTEE ON RESCUE
SUB-COMMITTEE ON MEDICAL AID
SUB-COMMITTEE ON SHELTER
SUB-COMMITTEE ON FOOD
SUB-COMMITTEE ON CLOTHING
SUB-COMMITTEE ON TRANSPORTATION AND COMMUNICATION
SUB-COMMITTEE ON REGISTRATION AND INFORMATION
SUB-COMMITTEE ON FUND RAISING AND PUBLIC INFORMATION
SUB-COMMITTEE ON CENTRAL PURCHASE AND SUPPLY
AS SOON AS NEEDED THE CHAPTER
WITH THE ADVICE AND ASSISTANCE OF THE NATIONAL ORGANIZATION
APPOINTS AN
ADVISORY COMMITTEE
TO CONSIDER REHABILITATION ON THE BASIS OF NEED TO FAMILIES AFFECTED BY THE DISASTER
such as
FOOD AND CLOTHING
OTHER MAINTENANCE
BUILDING AND REPAIR
HOUSEHOLD FURNISHINGS
MEDICAL AND NURSING
FARM SUPPLIES—LIVE STOCK AND EQUIPMENT
OCCUPATIONAL TRAINING EQUIPMENT AND SUPPLIES
AND OTHER SERVICES

* A. R. C. Pamphlet No. 209, page 35.

erates with them by assisting in the organization and direction of the medical and relief work and by providing the facilities which they may lack. Every effort is made to maintain and reëstablish as quickly as possible the predisaster relationships between physicians or dentists and their patients. If emergency hospitals are needed in the first few days, these are closed as soon as practicable and the patients returned to their physicians.

We believe that this broad program of relief and welfare is an endeavor representing the Red Cross at its peacetime best. With a background of experience and a national organization used to supplementing local aid when disaster strikes, the Red Cross is in a position to operate and coöperate effectively in disasters caused by disease, flood, tornado, earthquake, and belligerent enemy action.

RELATIONSHIPS WITH OFFICE OF CIVILIAN DEFENSE

Any review of the activities of the Red Cross Disaster Service naturally suggests the functional relationships between the Red Cross and the Office of Civilian Defense. In the agreement between the Chairman of the American Red Cross and the Director of the U. S. Office of Civilian Defense, the Red Cross has agreed to make available all of its facilities in time of emergency caused by enemy action. Recognizing the basic responsibility of government, it is the duty of every Red Cross Chapter and Branch to aid in the most efficient marshalling of the resources of the community. It is further agreed that duplication should be avoided, and that the training courses required in civilian defense and the long established nation-wide facilities of the Red Cross should be utilized to the fullest extent.

Services required in civilian defense activities should be made available by Chapters to local Defense Councils. Chapters should coöperate to the fullest extent and, during the period of emergency, should operate subject to the authority of the Defense Councils or appropriate governmental officials. Red Cross at all times will maintain administrative and financial control of its immediate operations.

In the comprehensive planning required for emergencies caused by enemy action, it is inevitable that confusion will arise as to function and responsibility. As we have viewed this problem on the national level and have heard reports from local areas, two factors it seems are responsible for this confusion.

1. The unwillingness of some individuals in local Chapters of the Red Cross to realize the need of integration of all services in time of disaster under one responsible authority.
2. The desire of certain Office of Civilian Defense representatives to take over and supervise all functions of all voluntary agencies before and during the emergency.

Much of this confusion, we believe, could be avoided if all local Red Cross Chapters would realize the need of coördination of activity and central control at the time of disaster, and if all Civilian Defense organizers would realize that the Red Cross Chapters have their regular programs to carry on before emergency strikes and are not subject in preëmergency periods to the authority of civilian defense.

SERVICES TO THE ARMED FORCES

It is erroneously assumed by some that the Red Cross is primarily responsible for the health of soldiers and sailors and the wounded in time of war. This is not the function of the Red Cross, but is the function of the Medical Departments of the Army and Navy. Without attempting to outline the numerous specialized activities which are involved, the scope of the Red Cross services to the armed forces may be broadly described as follows: The Red Cross conducts social service

and recreation activities for the benefit of members of the armed forces in Army and Navy hospitals wherever they may be. This includes medical and psychiatric social service in the general hospitals of the Army and Navy for the large number of patients who require this specialized assistance. The program on behalf of the hospitalized service men is particularly designed to aid service men during the convalescent period before they are able to return to duty, a period when morale is likely to be lowest. This service also provides for cases arising among service men which may involve communication with, and sometimes aid to, their families for the solution of special difficulties.

FIRST AID

First Aid as taught by the American Red Cross stresses the immediate emergency care given the victims of an accident in the absence of a physician. A good instructor will emphasize the negative aspects—what not to do—as well as the positive. Much confusion as to procedures outlined in the course would be avoided if it were constantly kept in mind that First Aid Instruction is designed primarily for the layman in giving emergency care before the arrival of a physician.

From June, 1910, to December, 1941, the Red Cross First Aid division issued three million certificates for completion of its Standard Course. Since entry of the United States into World War II the Red Cross has issued over five million textbooks. Certificates for the completed course are now averaging over 300,000 each month — or four million a year.

NURSING SERVICE

The Nursing Service of the American Red Cross is charged by act of Congress with the responsibility for maintaining a reserve of nurses adequate at all times to meet the needs of the armed forces. The Army and Navy expect to supplement their Nurse Corps from this reserve, all members of which have been certified by the American Red Cross as meeting the requirements of the Army and Navy Nurse Corps. This procedure relieves the Army and Navy of the preliminary investigation of all applicants and enables them to concentrate on the problems of assignment. A Red Cross nurse, once she is assigned by the Army or Navy, becomes a member of the Army and Navy Corps and is entitled to all benefits accruing to Army and Navy personnel.

This enrollment of Red Cross nurses becomes vitally important when the United States is at war. During the past twelve months 13,166 nurses were added to the Red Cross First Reserve roster. In addition there are now 60 American Red Cross nurses on duty in England, working as a part of the Red Cross–Harvard communicable disease unit, and a unit of 75 nurses, half of whom are now on duty, to supplement nursing service to the civil population in Hawaii.

In meeting disasters which occur in normal times and not as a result of total war, Red Cross Nursing Service plays an active part. There were only 22 days during the last fiscal year in which no nurse was engaged in disaster nursing, and at present the Red Cross maintains on call throughout the country a small reserve of nurses experienced in disaster nursing.

There are still many sections of the country where the official health agencies have not developed a nursing program. It is in these areas that the Red Cross Chapters are carrying on public health nursing. It is recognized as fundamental that the Red Cross Nursing Service pioneers and supplements—does not supplant—state and local nursing programs.

In the promotion of positive health,

it is recognized that the people themselves should assume some responsibility for maintaining their own health standards by awareness of symptoms which indicate ill health. To meet this need courses in Red Cross Home Nursing are offered. These are taught by professional nurses, and consist of at least 24 hours of practical instruction in how to keep the family well. The objective is to provide simple nursing care in the home to members of the family who do not need continuous hospital and nursing care. Last year 80,000 certificates were granted; this year it is estimated that more than a half million people will complete the course.

In view of the present demand for an adequate supply of nurses, and recognizing that the most important objective is to increase in every way the normal supply of graduate nurses, it yet seems clear that nurses' aides and assistants of several different kinds are needed to care for the sick and to prevent illness in our country in this time of war. It was, therefore, decided in July, 1941, that the Volunteer Special Services of the Red Cross and the Red Cross Nursing Service should collaborate in the development of a nationwide program for the training of Volunteer Nurses' Aides. In 45 states and the District of Columbia, 449 Chapters are carrying on such programs, and the American Red Cross has been designated by the Office of Civilian Defense as the sole training agency for these volunteer nursing aides.

NUTRITION

The Red Cross nutrition program today has a vital double significance in the total war effort of the nation. It helps build civilian power behind military power by providing men and women throughout the country with the knowledge of food needs and food values upon which stamina, working efficiency, and morale depend. It is primarily a long-range, continuing program of education directed to all income groups.

The Red Cross nutrition program is also an emergency program, training groups of lay volunteers in the preparation and serving of food in large quantities under emergency conditions in readiness for situations that might arise from disasters or enemy action.

JUNIOR RED CROSS

The American Junior Red Cross is a division of the membership of the American National Red Cross. Its 1942 estimated enrollment of 14 million is restricted to school pupils, including children in public, private, and parochial schools.

The purpose of the Junior Red Cross is to promote positive health, to provide opportunities for the participation of youth in worth while service activities, to give practice in responsible citizenship, and to assist in promoting international understanding.

This reserve of youth presents a dynamic potential and design for healthy living.

VOLUNTEER SPECIAL SERVICES

The purpose of Volunteer Special Services is to maintain in every Chapter regular services to the community, such as Production, Canteen, and Motor Corps. This provides a group of volunteer workers trained by year-round activity for prompt and efficient service in emergencies, those peacetime emergencies such as floods, fires, tornadoes, and the greater emergency of war. For example, last spring the Red Cross was requested to produce for the Army a reserve of 40 million surgical dressings and the Production Service is approaching the completion of this very practical task.

MEDICAL AND HEALTH SERVICE

In 1940 and 1941 the following new

projects were undertaken as a part of Red Cross participation in the national emergency program.

Enrollment of Medical Technologists—As of April 30, 1942, 25,196 inquiries had been made by medical technologists, 7,452 applications had been received, and there was a total net enrollment of 3,853. A sensitive index of the increased activity of the Red Cross since the attack on Pearl Harbor is shown by the increase in the number of inquiries from persons desiring to enroll as medical technologists. In contrast to the 1,061 inquiries received from June 30 to November 30, 1941, a period of 5 months, there were 1,357 inquiries received during the month of December alone.

The Doctors for Britain Project—In coöperation with the Office of Insular and Foreign Operations, the Medical and Health Service has assisted in answering the appeal of the British Red Cross to the American Red Cross to enroll American doctors to meet the shortage of doctors in British military and civilian hospitals. The doctors recruited are serving on the staffs of the Emergency Medical Service and in the Royal Army Medical Corps.

The Project for the Correction of Remediable Defects of Registrants Rejected for Military Service—The project for the correction of remediable defects of registrants rejected for military service was undertaken at the request of the Medical Advisory Committee of National Selective Service, and was a coöperative project of Selective Service, the District of Columbia Medical Society, the District of Columbia Dental Society, the Health Security Administration of Washington, D. C., and the American Red Cross. Objectives of the study were:

1. To determine the number of deferred registrants with remediable defects
2. To determine the number willing to have such defects corrected
3. To estimate the cost of remedying such defects

The findings of this study are now being used by Selective Service in estimating costs in state-wide rehabilitation projects.

The Blood Donor Service—In January, 1941, the American Red Cross and the National Research Council were requested by the Surgeons General of the Army and Navy to organize a coöperative project for collecting human blood to be processed into dried plasma for the medical departments of the Army and Navy.

The American Red Cross with the help of certain Chapters in the larger cities is responsible for enrolling the volunteer donors, safeguarding their interests, and delivering the blood collected to licensed biological companies who have contracted to process plasma. The Medical Division of the Research Council is responsible for instituting and directing all the technical phases of the work, particularly as it relates to the technic of taking blood from the donor and selecting or approving the collecting units to be used.

The original request presented by the Surgeons General called for the collection of a minimum of 10,000 pints of blood plasma to be dried and to be available for treatment to the armed forces. In May, 1941, the amount requested was increased to 215,000 units. This amount was increased materially following the attack on Pearl Harbor and the declaration of war. All told, a total of 1,280,000 units have been requested as of April 4, 1942.

To meet these requests, the Red Cross has opened Blood Donor Centers as rapidly as laboratory facilities to process the blood have become available. On December 7, 1941, 9 Centers were in operation. As of April 4, 1942, 18 Centers are in operation, 217,731 pints of blood have been collected, and total donations are being obtained at

the rate of more than 17,000 a week.

Blood collected by the 18 Red Cross Centers is shipped daily in refrigerated containers to the laboratories which have agreed to process it into dried plasma for the Army and Navy. Because of the many technical and financial factors involved, including the fact that the blood must reach the laboratory within 24 hours after it is drawn, the location of Centers has been restricted to areas near cities in which the processing laboratories are located.

Volunteers have responded willingly to the Red Cross call, and numerous cases have been reported in which emergency transfusions of plasma have saved or helped to save the lives of wounded American soldiers and sailors. Arrangements have also been made whereby emergency supplies of dried plasma will be available through the Red Cross in event of civilian disaster in this country.

Red Cross Blood Donor Centers are located in New York, Philadelphia, Baltimore, Buffalo, Rochester (N. Y.), Indianapolis, Detroit, Pittsburgh, St. Louis, Boston, Cleveland, San Francisco, Milwaukee, Los Angeles, Chicago, Cincinnati, Brooklyn, and Washington, D. C.

THE FUTURE

Today the activities of the American Red Cross are focused on meeting the demands of adequate defense and the needs of our fighting forces. But when the war is over and victory is secured, needs of reconstruction in this country and all over the world will tax the resources not only of the Red Cross but of all other agencies of good will. As the appeal came and was met after the last war, so it will be met again. In providing these services the Red Cross will not have to be called in—it will be there.

A New Technic of Health Education for Use in Baby Stations

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INTEREST in the use of tests as a technic for motivating the general public to acquire information has recently been stimulated by the use of quiz corners as teaching devices in health education and other fields.* In Newark, N. J., the Baby-Keep-Well Stations have adapted with considerable success the popular quiz session to an educational purpose, through the employment of "True or False" contest methods with groups of mothers who attend conferences.

As originally planned, using true-false statements as an educational device had as its primary objective instructing mothers in proper procedures for infant care. When the plan was put into operation, however, it developed that it was equally valuable for other purposes. It pointed out to the physicians those facts about baby care that were relatively or completely unknown to many of the mothers, and it also uncovered a number of wrong ideas which the mothers had. By concentrating on facts that were unknown and on the correction of wrong impressions, the physicians were able to make their instruction much more profitable. Furthermore, if he had previously taught some point now being tested, a physician could judge how effective his instruction had been.

The test questions constructed for initial trial dealt with the following phases of maternal and child hygiene:

- Feeding
  - Artificial or bottle feeding
  - Breast feeding
  - Cod liver oil
  - Orange juice
- Development
  - Habit training
  - Sleep
  - Teething
- Common infant disorders
  - Constipation
  - Cradle cap
  - Crying
  - Diarrhea
  - Vomiting
- Care of diaper and skin
- Clothing
- Fresh air

The questions were prepared by the physicians and were, in general, based on actual experiences at baby stations.† Many of them were intended to present mistaken or commonly held ideas such as: "Crying injures a baby's lungs." "Teething causes colds." "Belly bands keep the back straight."

After the first contests in the fall of 1940, succeeding ones have been con-

* See, for example, "Using Tests as a Medium for Health Education," Mayhew Derryberry and Arthur Weissman, *Public Health Reports*, vol. 55, 1940, pp. 485–489, and "The Quiz Corner as a New Informational Technique," Bureau of Agricultural Economics, United States Department of Agriculture, July, 1941.

† The use of the quiz session in Baby-Keep-Well Stations and the original set of questions were suggested by Dr. Ralph N. Shapiro, a member of Dr. Levy's staff.

ducted at intervals ranging from 1 to 3 months, with from 5 to 15 participants at each. The physicians at the stations have, in each instance, announced the date of a contest several weeks in advance and reminded the mothers in the interval. In addition to the physician's reminder, the nurses during home visits have encouraged mothers to attend.

Although in general the quiz sessions have been conducted as contests, a few physicians have preferred to omit the competitive feature and have, instead, a question-and-answer period. In each instance the physician introduced the session with a brief informal talk in which he explained the method that would be used, and usually compared it with the radio quiz programs with which most people are familiar.

In conducting the contests, two distinct methods have been used. When the first method is followed, each mother in turn is asked a question. About 25 questions are used, so that each participant has an opportunity to answer once or twice, to give reasons for her own answers, and to comment upon those given by others. According to the second method, the group is divided into competing teams. The division may be arbitrary, based on seating arrangement, for example, or on some characteristic such as the number of children a mother has. In the team arrangement the usual method of scoring has been to give one point for each correct answer and an additional one or two points' credit for a correct explanation or reason for the answer. If the individual who gives the correct answer (true or false) cannot also furnish a correct explanation, the other side is given a chance to do so. The physician who conducts the contest also briefly summarizes the information after each question has been discussed.

In the time allotted to a contest with its attendant discussion (usually less than an hour) the physicians find that they can use 18 to 25 questions, selecting those pertinent to the problems most commonly found in their particular stations. Since there are available 160 questions* from which to select, the physician has considerable latitude with respect to the topics he may wish to have discussed. By conducting the contest before the child health conference, it has been found that in general attendance has been improved.

Since the true-false contest was a new technic in health education, there was need for some evaluation of its effectiveness, when used by several physicians, before its real value could be determined. In order to find out more exactly how the method operated, stenographic transcripts of contests conducted by 7 physicians, each in a different health station, were taken between November, 1940, and April, 1941.

Five of the physicians used about 25 questions each, but the other 2 used 146 and 62, respectively. In the latter two contests, the percentage of questions about which there was no comment, discussion or explanation was 60 in the first case, and 90 in the other. The doctor sometimes said, "Yes, that's right," or "No, that's wrong," but gave no further interpretation. It would appear that at least those two contests achieved only a very limited amount of teaching, since there is nothing in the record to indicate that the physicians even made certain that correct answers were not the result of guess work.

Contrasted with the type of contest which is little more than a recital of questions are the other 5 of the 7 analyzed. There was discussion and explanation in over 90 per cent of all instances and in no case was a question passed by without some comment. In

* Mimeographed copies of the questions are available for limited distribution on request directed to the Health Department of the City of Newark, N. J., or to the Division of Public Health Methods of the National Institute of Health at Bethesda, Md.

two of the contests there was not a single question to which the answer was not discussed.

In the type of situation when there is secured not merely information in the form of discrete items of fact, but an understanding of related facts and an explanation of reasons, it is surely fair to say that real teaching has been achieved. The physician, therefore, has opportunity to find out what the participants know or do not know and also to present new or unfamiliar information, correct wrong impressions, and make sure that reasons are properly related to practice. That can only be done, however, if the physician observes certain cautions in using the contest technic in his child health station. As one observer remarked after seeing a true-false contest: "The success of the contest depends almost entirely upon the person who runs it, and how he does it." The manner in which the physician conducts the quiz is most important to the effectiveness of this method of teaching mothers. This implies active participation by the physician, not a mere recital of a series of items.

The first two contests discussed above illustrate test situations in which the educational value was reduced and definitely limited by the use of large numbers of questions. Mere recital of questions consumed a major part of available time and allowed little or no explanation. The "all right," "yes," "that is correct" type of comment by the physician serves as praise for the one participant to whom it is directed and is a source of satisfaction only to her. However, others present can derive no educational benefit from non-informative comment; hence a valuable opportunity for teaching is lost when there is not additional explanation of answers. Such discussions need not be long or very detailed. The following transcripts emphasize the importance of the physician's position as educator:

1. Always shake a lot of powder on the buttocks when the baby wets. True or false?

Doctor A	*Doctor B*
Mother: False.	Mother: False.
Dr.: Why is that wrong?	Dr.: Correct.
M.: It's not necessary. It sticks and cakes. You can oil the baby, use olive oil. For one thing, I have heard you can give the baby pneumonia from the dust.	
Dr.: This mother has thought about this. It will cake around the creases. Dust the powder on a puff and put it on. But the baby cannot get pneumonia from putting powder on the buttocks.	

2. Never use table sugar in the formula—there is not enough nutrition in it. True or false?

Doctor A	*Doctor B*
M.: False.	M.: That is false.
Dr.: Why?	Dr.: You are right.
M.: Because I never heard of any other kind of sugar to use for a baby.	
Dr.: Table sugar is just as good for a small baby as any other sugar. Only in special cases do we use other sugars.	

3. Teething causes colds in babies. True or false?

Doctor A	*Doctor B*
M.: False.	M.: False.
Dr.: Why?	Dr.: That's right.
M.: Teething does not cause any kind of illness. Baby may not have been dressed properly. It may have been in a draft.	
Dr.: That is what we are trying to bring out. Teething only causes teeth.	

In any evaluation of the quiz technic in health education, it is necessary to consider, in addition to its effectiveness in terms of learning, the attitude that it

produces in participants. The following transcripts are indicative:

Physician: I should like to ask you mothers what you think of these contests. Do you like this method?

Participant: Very much.

Physician: Do you think it makes much difference if you know *why* things are done?

Participant: I think if you know *why* you do these things, you are more apt to *do* them, and do them *right*.

Physician: Do you like this session, mothers?

Participant: Yes. Very much.

Physician: All of you?

Participants: Yes. You learn something. Have questions on older children next time.

The physicians conducting the contests have also expressed their opinions of the technic in such ways as:

Dr. A: I think it's the best means of getting discussion. It's the best way the Baby Station can get all the mothers to take part.

Dr. B: The contests are nice, but I think the information you want to get across is better delivered by the 5 or 10 minute talks we give all the mothers before each conference. The contests are popular though, the mothers make mistakes and all laugh, and we have a lot of fun.

Dr. C: The best plan is to have the contest before the conference. In that way you have better interest and more mothers stay.

Dr. D: About 40 or 45 minutes is the optimum length of time for the contest. It doesn't work well if you take much more time than this. And each station should space them at least 3 months apart. You can't have the quizzes more often than that if you want to keep the mothers interested in the game. But 3 months is just about the right time to repeat the contest with the same mothers.

The discussion and the quoted comments and criticisms above, taken together, highlight the characteristics of a good contest. Briefly stated, these may be considered the following:

1. *Participation* by all who attend.
2. *Informality* and the "game" spirit.
3. *Emphasis* on subjects of current interest and also on subjects unknown or relatively unknown to the participants.
4. *Adequate discussion* and explanation of the reasons for the answers.
5. A *coördination and summary* (on the part of the physician) of the information brought out during the discussion.
6. *Length* not to exceed 40 to 45 minutes for maximum interest to the particpiants.

Through the use of the True-False contest in baby stations, one of the primary interests motivating mothers to attend child health conferences is satisfied. The mother's desire for service and information brings her to the station. Physical examination of the baby, and the physician's recommendations constitute the service, but the mother also receives information on maternal and baby care during the conference.

The health education technic described here can increase the amount of information about maternal and child hygiene which the mothers get and can also aid physicians to determine where teaching is most needed and how it will be most effective.

SUMMARY

1. An adaptation of the popular quiz program has been introduced in baby stations.

2. Quiz contests can assist a baby station physician in giving information about maternal and child hygiene and thus aid in educating mothers in adequate health procedures by a popular technic, new in the field of public health education.

3. By means of contests, both physicians and mothers learn. The physician finds what subjects of maternal and child hygiene require special emphasis because they are unknown or relatively unknown to the mothers—information that can be utilized in improving subsequent child health conferences.

4. How the contest is conducted depends principally upon the physician who serves as moderator and educator in the test situation. The amount of teaching done is directly related to the way in which the quiz period is handled by the physician.

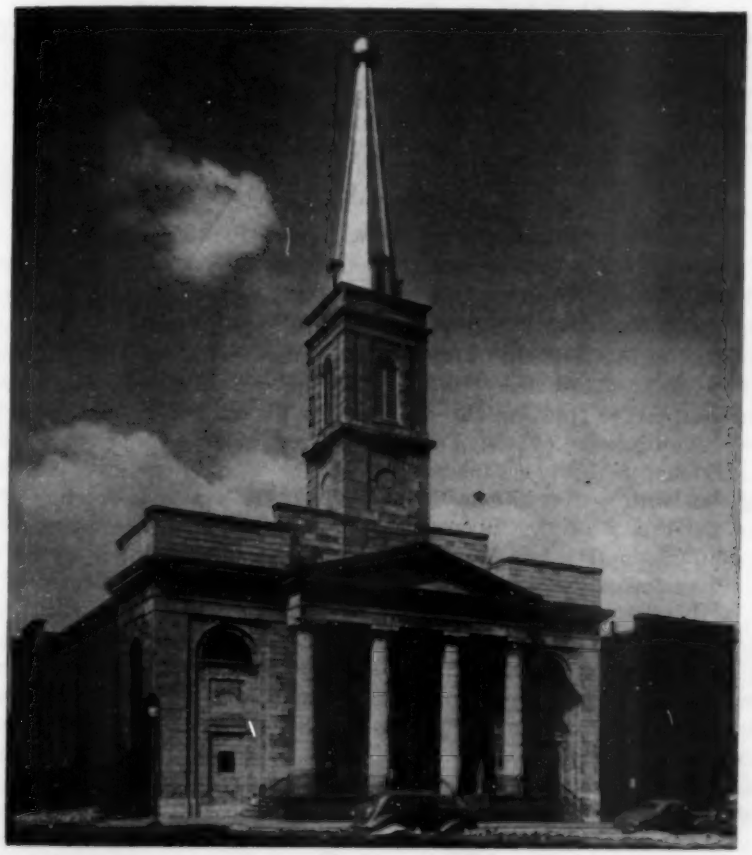
5. Characteristics of a good contest are:
   a. *Participation* by all the mothers
   b. *Informality* and the "game" spirit
   c. *Emphasis* upon subjects of current interest and other pertinent problems
   d. *Adequate discussion* and explanation of reasons for answers
   e. *Coördination and summary*, by the

physician, of the information brought out during the discussion period.

f. Length not to exceed 40 to 45 minutes for maximum interest.

6. Contests not having the characteristics above have little value in health education.

7. Although it has not been experimentally demonstrated, it is believed that variations of the quiz technic can be used in other types of public health clinics.



For frontier prayer when St. Louis was young was the Old Cathedral, which still stands on the river front.

Development of Tuberculosis and Changes in Sensitivity to Tuberculin in an Institution for the Feebleminded*

A Ten Years' Study

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IN 1930 a survey was made of the inmates of the Walter E. Fernald State School in Massachusetts, an institution for the feebleminded, primarily for the purpose of studying the comparative sensitiveness of the Pirquet and Mantoux methods of tuberculin testing, but with a view also to determining the extent of the tuberculosis problem in this hospital.[1, 2] All inmates were tuberculin tested and given an x-ray of the chest. Ten years later as many of these individuals as were still living at the school were reëxamined to determine what changes had occurred in their sensitivity to tuberculin and in their x-ray findings. Both surveys were conducted by the staff of the Division of Tuberculosis, Massachusetts Department of Public Health, with the cooperation of the institution staff.

The number originally tested and x-rayed was 1,656, of whom it was possible to reëxamine 1,023, in addition to reviewing the records of those who had died in the school during the interim. All inmates had been given an intracutaneous tuberculin test with 0.01 mg. of old tuberculin, and those who failed to react had been retested with 1.0 mg. Unfortunately, a record was not preserved of the individual reactions to different dilutions of tuberculin in 1930, all reactors to either 0.01 mg. or 1.0 mg. being recorded as "positive" on the medical records. However, a table was available showing the distribution of positive and negative reactions to the two dilutions by age groups in 1930. The same technic of intracutaneous testing was followed in 1940 as closely as possible. In both surveys the tests were performed and reactions interpreted by physicians experienced in this work. It is recognized, however, that there were variables which could not be entirely eliminated, such as variations in the lots of tuberculin used and individual differences in the interpretation of skin reactions and reading of x-rays.

Owing to the lack of adequate facilities, inmates found to have tuberculosis could not always be segregated from others as completely as was desired, and it will be seen that the original nonreactors frequently developed a positive test while in the institution. For the purposes of this study we are not concerned with the 51 inmates found to have significant tuberculosis in 1930, of whom 34 were again x-rayed in 1940,

* Read before the Epidemiology Section of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 24, 1941.

TABLE 1

Tuberculin Reactions by Age in 1930 and 1940

	1930							1940							
		Pos. to 0.01 mg.		Pos. to 1.0 mg.		Total Pos.			Pos. to 0.01 mg.		Pos. to 1.0 mg.		Total Pos.		
Age	Number Tested	No.	%	No.	%	No.	%	Age	Number Tested	No.	%	No.	%	No.	%
5–9	56	14	25	8	14	22	39	15–19	43	23	53	6	14	29	67
10–14	269	92	34	58	22	150	56	20–24	161	104	65	22	14	126	78
15–19	384	225	58	70	18	295	77	25–29	172	125	73	24	14	149	87
20–24	255	183	72	32	13	215	84	30–34	159	146	92	4	3	150	94
25–29	147	127	86	8	5	135	92	35–39	117	107	91	6	5	113	97
30–39	275	249	91	19	7	268	97	40–49	197	188	95	8	4	196	99
40–49	186	163	88	19	10	182	98	50–59	125	118	94	6	5	124	99
50 & over	84	70	83	10	12	80	95	60 & over	49	43	88	5	10	48	98
All ages	1,656	1,123	67.8	224	13.5	1,347	81.3	All ages	1,023	854	83.5	81	7.9	935	91.4

Mean age of inmates tested in 1930: 25.9 years
Mean age of inmates retested in 1940: 38.3 years

the other 17 having died. Also excluded from consideration were 14 cases reported to have died of tuberculosis whose 1930 x-ray films had been lost or destroyed, so that they could not be said with certainty to have been free from tuberculosis when first examined. For every person included in this study and classified as having died of tuberculosis or found diseased in 1940, we have the 1930 x-ray and have agreed upon reviewing it that the patient was free from pulmonary tuberculosis at that time.

An analysis of the results of the tuberculin testing by age in 1930 and 1940 is presented in Table 1. Each line in this table refers to a particular group of inmates; *e.g.*, the 43 children shown as having been retested in 1940 in the 15–19 age group are members of the group of 56 who were tested in the age group 5–9 in 1930. This arrangement was made to facilitate the comparison of the same groups over the period. This table shows that the individuals tested in 1930 now have a higher incidence of positive tests in each age group, as would be expected after an interval of 10 years. In order to compare the percentages of reactors in similar age groups at the time of testing, one should refer to Table 2, in which it is seen that for the same age groups the percentages were higher in 1930 than in 1940 up to the fourth decade of life, after which they remained close to 100 per cent in both years. This also might be expected in view of the general reduction in tuberculosis morbidity and mortality in the community.

TABLE 2

Percentages of Reactors in 1930 and 1940 by Age at Time of Test

	Per cent of Reactors to 0.01 or 1.0 mg. Tuberculin	
Age Group	1930	1940
15–19	77	67
20–24	84	78
25–29	92	87
30–39	97	95
40–49	98	99
50 and over	95	99

Turning now to the study of individuals, we have shown in Table 3A what happened to those who failed to react to the test in 1930. Here the age groupings are those of the original test period. Of the 131 persons whose tests were negative in 1930, 72, or 55 per cent, became reactors over the 10 year period. The application of the Chi-square test to the series indicates that the differences in frequency of conversion of a negative to a positive test by age are not statistically significant and could be due to chance. The same is true of the difference by sex, as seen in Table 3B.

TABLE 3A

Findings on Retest in 1940 of Previous Non-reactors, by Age

Age (As of 1930)	*Number Retested*	*Number Positive to 0.01 mg.*	*Number Positive to 1.0 mg.*	*Total Number Positive*	*Expected Number Positive*	*Per cent Positive*
5–9	22	7	3	10	12.1	45
10–14	56	25	10	35	30.8	62
15–19	33	14	5	19	18.1	58
20 and over	20	4	4	8	11.1	40
All ages	131	50	22	72	72.0	55

Value of Chi-square=4.02.

Probability of this age distribution in conversion to a positive test occurring by chance is > 0.2.

TABLE 3B

Findings on Retest in 1940 of Previous Non-reactors, by Sex

Sex	*Number Retested*	*Number Positive to 0.01 mg.*	*Number Positive to 1.0 mg.*	*Total Number Positive*	*Per cent Positive*
Males	93	39	16	55	59
Females	38	11	6	17	45
Difference (males–females)	..	..	..	..	14 ± 9.5

When we study the frequency with which tuberculin-positive individuals became negative, we find, as Table 4A shows, that the average frequency of reversion is 3.3 per cent over a 10 year period, but that the frequency is distinctly higher in the younger age groups. For all persons under 15, it is 12.7 per cent; for those over 15, 1.7 per cent. The difference is 11.0 ± 3.0, which is statistically significant. In other words, the excess in reversions of a positive test to negative among children is greater than one might expect from chance alone. Table 4B shows that males and females behaved alike in this respect.

TABLE 4A

Findings on Retest in 1940 of Previous Reactors, by Age

Age (As of 1930)	*Number Retested*	*Number Who Remained Positive*	*Number Who Became Negative*	*Per cent Who Became Negative*
5– 9	21	19	2	10
10–14	105	91	14	13
15–19	139	130	9	6
20 and over	627	623	4	1
All ages	892	863	29	3.25
5–14	126	110	16	12.7
15 and over	766	753	13	1.7
Difference	...	...	..	11.0 ± 3.0

TABLE 4B

Findings on Retest in 1940 of Previous Reactors, by Sex

Sex	*Number Retested*	*Number Who Remained Positive*	*Number Who Became Negative*	*Per cent Who Became Negative*
Males	519	502	17	3.3
Females	373	361	12	3.2

TABLE 5

Institutional Deaths from Tuberculosis Between 1930 and 1940, by Age and Result of Test in 1930

	Among Non-reactors		Among Reactors	
Age Group (1930)	*Number Tested (1930)*	*Deaths*	*Number Tested (1930)*	*Deaths*
5– 9	34	1	22	..
10–14	119	2	150	..
15–19	89	3	295	..
20–24	40	3	215	3
25–29	12	..	135	1
30 and over	15	..	530	1
All ages	309	9	1,347	5
Per cent dying of tuberculosis		2.9	...	0.4%
Difference (reactors–non-reactors)		2.5±1.0		

Tables 5 to 8 deal with the frequency of clinical tuberculosis in the group. Fourteen deaths during the 10 years were ascribed to tuberculosis. Autopsy was obtained in 6; positive sputum was reported in 3 others; in another group of 4, while no sputum reports are found, there were typical tuberculous lesions in the lungs by x-ray. The remaining case died after transfer to another institution, of tuberculous meningitis. One of the autopsied cases also died of meningitis.

Table 5 gives the age distribution of those dying of tuberculosis between 1930 and 1940, and classifies them according to their previous tuberculin reactions. It also shows the deaths as percentages of the number tested in 1930, or roughly as mortality rates. It should be realized, however, that the percentages given are not true mortality rates because the population at risk was declining somewhat during the period and was not equal to the original number tested; furthermore, the time interval was 10 times that conventionally used in computing death rates. It will be noted that the mortality rate over the 10 year period was significantly higher among previous non-reactors than reactors, and that the non-reactors who died were on the whole younger than the reactors; this latter finding is of course due to the fact that most of the non-reactors were found in the younger age groups.

TABLE 6

Cases of Tuberculosis Discovered in 1940 Survey, by Age

Age Group (1930)	*Number X-rayed (1940)*	*Cases Found*
5– 9	43	..
10–14	161	2
15–19	172	1*
20 and over	647	4
All ages	1,023	7

* This was the only case found in a previous non-reactor.

In Table 6 are shown the ages of patients diagnosed as having pulmonary tuberculosis in the 1940 survey. Table 7 presents the incidence of tuberculosis, including both deaths and newly diagnosed cases, basing the rates upon the numbers of reactors and non-reactors when tested in 1930. Here again the disease appears with significantly greater frequency among non-reactors. Five of the newly diagnosed cases and 8 of the deaths were males.

TABLE 7

Incidence of Tuberculosis, Including Both Deaths Prior to 1940 and Cases Discovered in 1940, by Result of Original Test

	Reactors	*Non-reactors*
Number tested in 1930	1,347	309
Cases of tuberculosis subsequently developed	11	10
Per cent	0.8	3.2
Difference (reactors–non-reactors)		2.4±1.0

TABLE 8

Interval Between Original Test and Death from Tuberculosis, by Result of Test

Number of Years Between Original Test and Death	*Original Reactors*	*Original Non-reactors*	*All Inmates with Negative X-ray in 1930*
0–4	..	..	..
5	1	1	2
6	1	..	1
7	2	4	6
8	1	2	3
9	..	1	1
10	..	1	1

Table 8 shows the intervals which elapsed between the study in 1930 and the time of death, for those inmates who died of tuberculosis after having had a normal chest x-ray. There were no deaths in the first 4 years; and the previous reactors appear, on the whole, to have died somewhat earlier than the non-reactors.

When the cases were classified by the hospital buildings occupied at the time of the 1940 survey, it was noted that 3 of the 7 living cases of tuberculosis first diagnosed at this time were from one section, North Building. The incidence here was 3 out of 116 x-rayed, as contrasted with 4 out of 907 x-rayed in the rest of the institution. Three of the 14 patients who died of tuberculosis prior to the 1940 survey were recorded as living in this same building at the time of the original survey.

Furthermore, out of the 116 resurveyed inmates of North Building, there were 13 non-reactors who became reactors, and the percentage of positive reactions, both for the entire building and within the age groups separately, was higher than in the rest of the institution. The median age of inmates of North Building was 21.6 as against 24.2 for the entire school.

The crude incidence of positive reactions was 96 per cent for North Building, and 90.8 per cent for the rest of the institution; this difference is statistically significant. It is also of interest that there were no reversions of a positive test to negative in this building. North Building houses the male inmates of lowest mentality whose mental condition makes them least capable of observing rules of hygiene.

COMMENT

This group provided an unusual opportunity for investigation of the epidemiology of tuberculosis. Most similar studies are conducted with persons followed for varying lengths of time, which necessitates the use of a method of analysis based on "observation years" or the adaptation of the life table principle. Both of these methods are undesirably complex, and the observation years method fails to take into consideration varying degrees of risk to which persons may be subject at different periods after the beginning of observation. No such calculations were here necessary, because the entire group was followed for the same fixed period of time.

Our interpretation of the data on incidence of infection by age is that, for inmates under the age of 30 at least, the total exposure to tuberculosis in their homes and since entering the institution has been less than it was 10 years ago for the corresponding age groups. This requires the assumption that the 633 patients discharged, paroled, or dying subsequent to 1930, did not differ from those who remained, with respect to tuberculous infection. The figures also show, however, that fairly heavy exposure has continued within the school, for there has been a considerable increment of persons infected since 1930 in each age group up to 30 years of age. That the total exposure of this group has been greater than that of public school children, for example, is shown by Table 9, which contrasts them with other groups surveyed by the department.

Why the re-test should show a higher frequency of reversions from positive to negative in the younger age groups we cannot explain. More evidence to con-

TABLE 9

Comparative Results of Tuberculin Testing with 0.01 mg. O. T. in Massachusetts

Group	Year Studied	Average Age	Number Tested	Per cent Positive to 0.01 mg. O. T.
Urban High School children	1939–1940	14–15	4,618	24.9
		15–16	4,302	29.9
		16–17	3,796	33.1
		17–18	3,066	36.7
Civilian Conservation Corps enrolees	1937	20.5	1,115	44.8
Medical and Dental School freshmen	1936–1938	22	472	41.3
Fernald School inmates	1940	15–19	43	55
		20–24	161	65

firm or refute this finding should be obtained before an explanation is offered.

The higher incidence of tuberculosis in initial non-reactors was of particular interest to the authors because of our own studies indicating that public school children with a positive reaction develop tuberculosis more often than non-reactors.[3] Many advocates of both views can be found; the majority probably look upon the uninfected person as showing a higher incidence. We do not feel that the results of this study are necessarily incompatible with those referred to above, because the groups studied differed widely in composition and environment. The public school children were living normal lives in an environment which usually afforded little exposure to tubercle bacilli, as shown by the small annual increase in percentage infected. In the Fernald School, on the contrary, there was heavy exposure, as indicated by the more rapid rise in the proportion infected with increasing age.

A hypothesis to fit these observations can be advanced with the aid of the following assumptions: First, that pulmonary tuberculosis can develop in the previously infected person, both from fresh infection or superinfection, and from endogenous reinfection. Second, that the previously uninfected person is more likely to break down than the infected one, when heavily exposed to tuberculosis—that is, that old infection confers some protection against disease resulting from new exposure. Then one may expect that, in persons whose environmental contact with tuberculosis is heavy and continuous, most of the cases will develop among previous non-reactors; while among persons with little exposure, a relatively large proportion of cases will result from endogenous reinfection, the total number of such cases being of course much smaller than in the former group. In other words, among the public school children endogenous reinfection played a relatively important rôle, while in the Fernald School it was overshadowed by the part played by continued contact with tuberculosis. The percentage of reactors to tuberculin in the second and third decades is well above that encountered in other groups which the department has tested recently. The comparison is made on the basis of reactions to 0.01 mg. of tuberculin because of the fact that only this strength was used in the other groups.

It will be noted that the inmates were not classified and studied according to their exposure to tuberculosis within the institution. This was because it was not felt that such a classification could be made with accuracy in view of the presence of tuberculosis cases which could not be entirely segregated, and the poor hygiene practised by these patients.

Attention is called to two other recent studies which dealt with similar material. Flahiff [4] found that among persons admitted to a mental hospital in Jamaica, B.W.I., where tuberculosis was prevalent, the rate of onset and the death rate from the disease were higher in those who did not react to tuberculin on admission than in those who were sensitive to tuberculin on admission. Plunkett, Weber, Siegal and Donk [5] made an investigation of the inmates of a state school for mental defectives in New York State which showed a marked difference in the frequency of development of a positive tuberculin test and incidence of tuberculosis, depending on whether the individual was exposed to an infectious case. Every case of reinfection type tuberculosis which developed could be associated with the presence of an infectious case in its immediate environment. It was noted that the rate of change from negative to positive reactions was higher in all age groups among males. We found a similar sex difference in the total number of non-reactors who became positive, but it was not statistically significant.

SUMMARY AND CONCLUSIONS

Of 1,656 inmates of a school for feebleminded who had been tuberculin tested and x-rayed in 1930, 1,023 were restudied in 1940. The percentage of positive reactors was somewhat higher than in 1930, but when compared by age groupings at the time of the test, there was a slight falling off up to the age of 30.

Former reactors reverted to a negative state more often under the age of 15 than above this age. Tuberculosis developed most frequently, and conversions from a negative to a positive tuberculin reaction were most common among inmates of the building for patients of lowest mental status.

The subsequent incidence of tuberculosis was higher among those who failed to react to tuberculin in 1930 than among the reactors.

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Food Establishment Sanitation in a Municipality*

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IT is true as Rosenau [1] has said that all public health work is based upon the four fundamental needs of human welfare, namely, food, shelter, defense, and propagation. The safeguarding of the food supply of a community, it appears then, is one of the essential functions of a health department. The responsibility for the inspection of food establishments in municipalities is almost invariably assumed by this department. In states, as well, this responsibility is generally vested in health departments.

The fundamental principles of sanitation of food establishments require that the protection of the health of the consumer against dangerous foods and the general cleanliness and appearance of the establishment be given first consideration. This combined activity requires all-out efforts of the food inspection personnel; it is not really a health department function to be active in preventing fraudulent trade practices.

Slack [2] has pointed out that during recent years the conception of the duties of the food inspector has undergone a great and important change. Whereas formerly his activity was largely devoted to the search for adulterated, spoiled, and unwholesome food, and prosecution of the dealer, the intelligent food inspector of today seeks to cooperate with the dealer to insure the marketing of foods of high quality. It is, as he says, the joint responsibility of the producers, the dealer, and the inspector to see that the food offered to the public should not present a health hazard, whether from the viewpoint of containing disease producing organisms or from any other of the various ways in which food may be harmful to health.

PRIMARY OBJECTIVE OF FOOD ESTABLISHMENT INSPECTION

The primary purpose of food establishment inspection from the public health point of view is to prevent food poisoning and infections transmitted by food. In order to prevent illnesses the underlying causes must be known. Then there must be developed a practical procedure for applying the means of prevention.

To prevent food illnesses, the causes of which are given in Table 1, the combined sciences of bacteriology, chemistry, engineering, epidemiology, pedagogy, toxicology, and statistics must be applied. For example, in combating botulism, familiarity with both bacteriology and canning principles is necessary. Consumers and merchants must be informed of the necessity for destroying spoiled canned food. Canners and housewives must be taught that specific times and temperatures must be adhered to for each product canned.

Familiarity with the Salmonellas, a study in itself, must be had. Havens [5]

* Read at a Joint Session of the Engineering and Food and Nutrition Sections of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 15, 1941.

TABLE 1

Causes of Food Poisoning and Infections

	Foods Often Implicated	*Usual Time of Onset*
	Of Bacterial Origin	
Clostridium Botulinum toxins	Improperly processed canned and bottled food	12 to 24 hours
Staphylococcus enterotoxin	Custard pastries, cooked ham, hollandaise sauce, sliced cooked meats	3 to 6 hours
Salmonella infections	Sliced cooked meats, meat and poultry salads, "warmed over" foods, custard-filled pastries	6 to 18 hours
Enteric infections		
Typhoid fever	Oysters, raw milk, other dairy products	3 to 38 days
Bacillary dysentery	Salads, "warmed over" foods, milk and other dairy products	1 to 7 days
Tularemia	Wild rabbits (by handling)	1 to 10 days
	Of Nonbacterial Origin	
Inorganic chemicals Arsenic, Lead Fluorides Antimony Cyanides Cadmium, Zinc Copper, Barium Others	Any food accidentally contaminated	Several minutes to hours, depending upon dosage
Poisonous animals and plants	Rhubarb leaves, mussels in certain seasons, poisonous mushrooms, poisonous fish	Variable
Animal parasites	Trichinella in pork Diphyllobothrium in some fish Taenia in beef	Several days to weeks
Allergies and environmental circumstances	Specific foods consumed by persons allergic to these foods Consuming food while exposed to dangerous gases (CO), high temperatures, etc.	Immediate to several hours

states, "No other group of bacteria, with the possible exception of the streptococci, present such a varied assortment of bacteriological problems, pathological manipulations, and epidemiological peculiarities as do those closely related bacteria of which the paratyphoids may be taken as the type." Preventing the Salmonella type of food poisoning requires teaching skill. Public health educational methods must be applied to teach individuals and groups of food handlers to keep clean, to bring into use ample lavatory facilities conveniently installed, and to bring about efficient refrigeration of ready-to-eat foods. In this latter effort, the fundamentals of refrigeration must be known; often it is extremely advantageous to call upon the engineer for specific instruction in refrigeration engineering.

In order to prevent infections of food by the enterotoxin producing Staphylococci, it must be recognized that open sores and skin abrasions in food handlers are possible sources of these organisms. The reheating of custard-filled pastries as suggested by Stritar, Dack, and Jungewaelter,[6] and Gilcreas and Coleman,[7] must be explained in detail to bakers. Chefs in hotel kitchens must be taught the reason why hollandaise sauce should be discarded within 4 or 5 hours after it has been made. Meat plant operators under both federal and municipal supervision must be con-

vinced that the newer type of ready-cooked and tenderized hams should be processed, prepared, and wrapped with a minimum amount of hand contact, and that regular medical inspection for skin abrasions should be maintained for all persons touching this type of food.

While the investigation of cases and outbreaks of typhoid fever and dysentery is the duty of the epidemiologist, material aid can frequently be given by the food inspection personnel, particularly in preventing recurrence of these diseases. A review of records of receipts and sales of shellfish dealers facilitates tracing shellfish to their source if this food is implicated. Known typhoid fever carriers must be convinced of the danger of handling food intended for others and for the need of voluntarily withdrawing from such activities. Dysentery infections may be prevented by applying the same methods as for the Salmonella infections. Tularemia can be prevented by banning the sale of wild rabbits. The enforcement of this prohibition requires the patrolling of railroad and truck terminals and wharves during certain seasons and can be carried out along with the enforcement of the compulsory shellfish certification requirement. All milk sold in a municipality should be pasteurized under the supervision of personnel trained for this duty.

Food illnesses caused by poisonous chemicals can be prevented by equipping the food inspector with simple testing outfits. Fluorides, arsenic, and cyanides can be detected readily by means of such portable equipment. Enforcing restrictions against the use and sale of fluorides, except of the tinted variety, prohibiting the use of cyanide-containing metal polishes in food establishments, and advising against the use of bare copper, galvanized and cadmium-plated, and some types of gray agateware food containers, and poisonous chemicals employed as insect and rat eradicators, should be a part of the daily routine in guarding against food contamination by poisonous chemicals.

The importance of thorough cooking of pork and some fresh water fish should be explained to food merchants and consumers and also to civic, educational, and religious organizations, as an effective means of preventing illnesses caused by parasites found in these foods.

Information concerning poisonous plants and animals, the fact that food consumed under certain unfavorable environmental conditions may cause symptoms resembling food poisoning, and that certain individuals may be allergic to some wholesome foods, should be emphasized to food merchants and consumers at group meetings.

COÖPERATION WITH FOOD INDUSTRY ESSENTIAL

It is essential that the coöperation of representatives of the food industry and others be obtained, for it can readily be seen that in attempting to protect the consumer against the food-borne diseases, education and coöperation are the principal weapons of the health officer. Except in some instances, as for example, the prohibiting of the sale of wild rabbits to prevent tularemia and cyanide silver polishes in food establishments, legislation cannot be used as the only preventive measure. The food handler must be instructed in the fundamentals of food sanitation. Education of the employed food handler, however, can be effective only when the owner of the food establishment endorses such a procedure. The effectiveness of compulsory medical examination of food handlers is still debatable among public health officials, with the majority apparently not in favor of this costly procedure. Education of food handlers seems to be supplanting this old-time practice. The reheating of custard-filled pastries, exerting care in ham processing and handling, and the washing of hands

after leaving the toilet require the wholehearted interest and coöperation of the industry with the health official. Supervisory personnel of organizations within the food industry can be trained in relatively short periods of time and used as unofficial food inspectors of their own organizations and, with the coöperation of the industry, can be of valuable assistance as liaison personnel between the official inspector, the food handler, and the management.

It is most important that regular contacts be maintained with state and federal food control officials and neighboring municipal food inspection personnel. Regular scheduled meetings should be planned, at which time experience during inspections, results of special investigations, new legislation, and new methods should be reviewed and discussed.

In obtaining corrections of undesirable conditions relating to food establishments, it has been found also that educational methods are by far the most effective way to obtain results. This method is one of the three mentioned by Rosenau,[1] "There are three ways of obtaining results, (1) through military or arbitrary ways; (2) through legislative or punitive ways; and (3) through the establishment by education of standards through group consciousness." Modern public health administrative efforts are apparently leaning toward the last method. This is as it should be. Modern police departments have adopted educational procedures as aids in enforcing certain laws and in crime prevention. The interest of a coöperative public can be capitalized to aid in effecting corrections of undesirable conditions that would be difficult to obtain by compulsion. Included in the coöperative public groups, of course, are members of the food industry. An educational procedure that has proved effective is the semi-regulatory one that combines regulatory action with education, namely, that of health department hearings. At the conference or hearing, past and current findings during inspections are brought out, and instruction, advice, and warnings as needed are given to the individual or entire industry directed to appear for such conferences.

GROUPING OF FOOD ESTABLISHMENTS

For ease of assignment and inspection, it has been found by over ten years' experience that it is expedient to group food establishments located in a municipality into three classes: (1) wholesale, (2) manufacturing, and (3) retail. Food manufacturing establishments include bakeries, canneries, dairies, refineries, and other factories of this type. Warehouses, railroad terminals, wharves, cold storage plants, etc., comprise the wholesale establishments. Under retail establishments are included kitchens of schools, hospitals, homes for the aged and orphanages, retail markets, food stores, restaurants, hotels, and similar establishments. This grouping of food establishments creates a first, second, and third line of defense respectively against unwholesome food reaching the consumer.

ASSIGNMENTS FOR INSPECTIONS

It has been found in large municipalities that assignments for routine inspections by census tract subdivisions of the community result in more effective coverage of all retail food establishments. The use of census tracts as small units or as individual communities also aids in obtaining information concerning improvements in food establishment sanitation from year to year, and makes statistical analyses of results more profitable.

ESSENTIAL FORMS

A duplicate inspection record form has been found to be convenient * and serves the threefold purpose of (1) pro-

* Samples obtainable from the author.

viding a means of giving written instructions to the food establishment owner; (2) providing a permanent file record of the findings during inspection, eliminating the necessity of posting to a second form inspection findings; and (3) supplying the information on the copy for transfer to a punch card where desirable.

ALLIED ACTIVITIES

In addition to the basic duty of maintaining inspection of food establishments to prevent food illnesses, and to maintain them in a good sanitary condition, a food control bureau must necessarily engage in other activities. Filth in food should not be tolerated, regardless of the fact that it may be harmless. A project on this activity carried to completion is valuable in sensitizing the food industry against carelessness. Adulteration, misbranding, and mislabeling of foods must not be entirely overlooked, but when found it is more expedient to report these findings to state or federal agencies for action by those who are primarily responsible for this type of activity.

Food utensil washing and disinfection must be given consideration and should be a basic and continuous project. Each inspector should be trained to determine rinse water temperatures in dish washing machines, to test the strength of chlorine solutions, and to be able to swab food utensils without contamination of the swab. A compact food utensil swabbing bottle for this purpose has been described.[8]

Complaints pertaining to food or food handling methods must be investigated quickly and given immediate attention to be of value in correcting undesirable conditions in a community. While it is admitted that often only 10 per cent of the complaints are justified, these 10 per cent often lead to corrective measures being applied to all food establishments in the community.

Dual water supplies, cross-connections, inadequate ventilation and lighting, garbage and waste disposal, insect and rat eradication, occupational hazards among food handlers, reviewing plans for new plants and alterations to existing plants are other problems that must receive attention. In all of these additional activities no attempt should be made to operate without aid from other bureaus or divisions within the health department or in the state health agency. In the investigation of food poisoning outbreaks it has been found that a team of investigators consisting of a physician, usually the epidemiologist, a bacteriologist or chemist or both, and the food official, facilitates intelligent interpretation of findings and eliminates a great deal of unnecessary laboratory work. Preferably the physician connected with the health department should make the contact with the physician attending the ill persons; the food official or physician may obtain information from the individual cases and may secure all samples of food available and of body discharges. No sample is submitted for laboratory examination until the findings and facts are reviewed by all members of the team, and only the food or foods common to all of the persons made ill are submitted for bacteriological or chemical analyses.

In the investigation of dual water supplies and cross-connections a sanitary engineer should be consulted. In occupational hazards the occupational disease physician, if available in the health department, is called upon for aid. Ventilation, lighting, and garbage and waste disposal are types of problems which should be discussed with industrial hygiene or sanitation personnel of the department.

TRAINING OF PERSONNEL

Regardless of the basic training of the food establishment inspector, in-service

instruction is needed as a constant supplement. Chemists, bacteriologists, and sanitary engineers are scientifically trained for this type of position, yet in-service training must be continued during the entire period of actual duty. As an example, the science of nutrition must be taught to the basically trained food inspector. The fortification of milk and other foods has a certain popularity. It leads to advertising racketeering and therefore has not especially endeared itself to some public health officials. The newer findings in food sanitation must be taught and research problems, even in food inspection activities, should be planned and discussed as part of the in-service training.

SUMMARY

Food inspection in a municipality has developed into a comprehensive field, requiring knowledge of the causes of food poisoning and food infections and utilizing all of the sciences practised by public health officials in preventing these illnesses and in maintaining the food establishment in a clean condition. The corrective measures employed include educational methods in the main. The coöperation of all public health, industrial, and lay agencies is of importance in this educational procedure.

Economic aspects of food control, while desirable, should be given seccondary consideration over those of more public health importance.

Record keeping should be simple; punch cards and sorting machines are recommended where the numbers of records warrant. Assignments by census tracts should be made, keeping pace with the best health department practice. Personnel adequately trained in bacteriology, chemistry, and sanitary engineering only should be employed for food establishment inspections. In-service training must be continued regardless of the basic training of the employee.

In food establishment inspection, as in all public health work, the population of the community should be studied. Procedures that are to be employed to prevent food poisoning and undesirable conditions in food establishments should fit in with the temperament of the community. A health-conscious community will usually respond to educational methods sponsored by the health department. The procedures mentioned are those that can be adopted in a moderately large community or modified for smaller communities.

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A Simplified Medium for Pathogenic Organisms

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THE recent advances in our knowledge of the nutritional requirements of bacteria have opened the possibility of simplifying the standard media at present in use in bacteriological laboratories. The obstacle in the path of such simplification is the fact that each of the more parasitic forms has specific requirements of its own, and consequently it is not easy to find an extract which will combine the accessory substances found both in meat extract and in serum.

This note reports our experience with a new medium, relatively simple in composition, easy to prepare and satisfying the requirements of some of the more fastidious organisms encountered in daily work. It is the by-product of studies now in progress on the growth accessory substances for *Streptococcus hemolyticus* and *Pneumococcus*.

The medium consists of the following ingredients:

A. *Peptone—Salt Solution*

Peptone (Difco)	5.0 gm.
NaCl	5.0 "
$Na_2H\,PO_4 \cdot 12H_2O$	2.5 "
KH_2PO_4	0.35 "
$MgCl_2 \cdot 6H_2O$	0.3 "
H_2O	1,000 ml.

B. *Tomato Juice* 40–60 ml.

Solution A is prepared in the usual way and autoclaved. If an agar medium is desired, 20 gm. of agar are dissolved in a portion of the water and added to the hot peptone salt solution before autoclaving. To the sterile liquid or solid medium are added 4 to 6 per cent of a sterile extract of tomatoes (Solution B).

The tomato extract is prepared from fresh, washed tomatoes (preferably the variety used for juice) either by a juice press or by passing them through a meat grinder. The watery pulp is filtered through filter paper. The clear filtrate is neutralized to pH 7.0 (usually 6.0–7.0 ml. N/1 NaOH is required to 100 ml. of filtrate), and sterilized by steaming in the Arnold sterilizer or by filtering through a Seitz filter.

The original filtrate has a reaction of pH 4.2 and if left unneutralized can retain its activity for months. It is best, therefore, to sterilize it before neutralizing and to add the requisite amount of NaOH as and when required. Steaming in the Arnold or boiling for a few minutes does not reduce appreciably the activity of the extract; autoclaving, however, destroys a large part of the activity.

Tomato juice is fairly rich in accessory substances needed by bacteria, such as thiamin, riboflavin and nicotinamid, as well as in some other substances not yet identified. It has been used before as a source of growth accessory substance. Thjötta and Avery (1921) used it as a source of factor "V" for *Hemophilus influenzae*. Jenkins (1923) recommended its use for the cultivation of streptococci; the proposed medium

did not prove satisfactory presumably because the author autoclaved the extract and thus destroyed the major portion of the accessory substance. Kulp and White (1932) used it for growing lactobacilli by adding 40 per cent tomato juice to a peptonized-milk-peptone medium.

Our medium has many advantages over the standard medium used at present. It is very easy to prepare. There is considerable saving of time—since no clearing or filtering of the medium is necessary. It is much less expensive than meat extract or meat infusion media. And finally it is suitable for growing some organisms which do not grow readily on standard broth or agar. In addition to the easily cultivated colon-typhoid group of bacteria, Brucella, Pasteurella, Lactobacillus, Streptococcus, Pneumococcus, and *Corynebacterium diphtheriae* give good growth on this medium.

Comparative growth tests made in the tomato medium and in standard laboratory broth or broth plus serum showed up to the advantage of the first. Tubes containing the same volume of nutrient solution were given equal small inoculations (0.1 ml.) from the same diluted saline suspension of bacteria prepared from a 24 hour agar-slant culture. After incubating for 20 or 40 hours, the respective tubes were centrifuged at high speed to obtain complete sedimentation, the sediments resuspended in 5.0 ml. saline and the relative density determined in the photoelectric colorimeter (Evelyn 1936). The results of one series of experiments are given in Table 1.

These figures show clearly that the proposed medium is not only superior

TABLE 1

Relative Growth Densities of Various Organisms in Standard Broth, Serum-broth, and Tomato Juice Broth (T.J. Broth)

Culture	*Medium*	*Colorimeter Reading (100=No Growth)* 20 hr. Growth	40 hr. Growth
1. *Streptococcus hemolyticus* H 7276	Broth	97	96
	Broth + 10% serum	80	79
	T.J. broth	90	69
2. *Streptococcus hemolyticus* (Richards strain H. McIlwain)	Broth	97	97
	Broth + serum	74	76
	T.J. broth	71	64
3. Pneumococcus H 6480	Broth	96	93
	Broth + serum	71	83
	T.J. broth	77	85
4. *Corynebacterium diphtheriae* (gravis)	Broth	89	60
	Broth + serum	85	48
	T.J. broth	85	43
5. *Pasteurella lepiseptica*	Broth	..	99
	Broth + serum	..	96
	T.J. broth	..	97
6. Lactobacillus	Broth	72	..
	T.J. broth	46	..
7. *Eberthella typhi*	Broth	57	..
	T.J. broth	35	..
8. *Shigella dysenteriae (Shiga)*	Broth	72	..
	T.J. broth	49	..
9. *Brucella abortus* I	Broth	..	96
	T.J. broth	..	78
10. *Brucella abortus* II	Broth	..	88
	T.J. broth	..	83

to the more expensive standard broth, but that it generally is as good as or better than broth containing 10 per cent serum. The results on solid media parallel those in fluid media but do not lend themselves to quantitative comparison.

The results given above are typical of those obtained with a large series of strains from different sources. Tests were also made with a variety of obligatory anaerobes. Growth in McIntosh anaerobic jars on the T.J. agar was as good as on 1.0 per cent glucose-blood agar, but was better than that on 1.0 per cent glucose-agar.

This medium has also proved satisfactory as a basis for a variety of special media:

1. Addition of 10 per cent blood gives an excellent medium for cultivating Neisseria and Hemophilus.

2. It is as good as Loeffler's medium for cultivating *Corynebacterium diphtheriae* from swabs. Tests made in our diagnostic laboratory with 100 routine swabs gave the same results as Loeffler medium, and because of its transparency the colonies on this medium can be more readily differentiated from those of other organisms. Toxin production appears to be as good as on other media, but no quantitative test has as yet been made.

3. The addition of minimal amounts of tellurite 0.03–0.04 per cent to this medium offers a satisfactory differential medium for the various sub-types of *Corynebacterium diphtheriae* as well as for the common diphtheroids. Xerosis and Hoffmanni are readily differentiated from true diphtheria organisms. After 48 hours mitis can be differentiated from gravis and intermediate, but the last two are not readily distinguished.

Corynebacterium xerosis, gives heavy growth, black colonies.

Corynebacterium hoffmanni, slight growth, colorless colonies.

Corynebacterium diphtheriae (gravis), medium sized greyish colonies with a dark center.

Corynebacterium diphtheriae (mitis), small colonies, black with only a slight greyish rim.

4. Both MacConkey and Kliger medium can be readily prepared with T.J. agar as a base.

SUMMARY

This note presents a new basic standard medium which has many advantages over the one at present in use in bacteriologic laboratories. It is a simpler medium, more easily prepared with considerable saving in time and materials. It supports growth of all common pathogenic bacteria as well as many of those having special requirements, such as the streptococci, pneumococci, diphtheria bacilli, and lactobacilli. The Neisseriae do not grow on this medium without the addition of blood.

This medium can also be used as a base for the common differential media: tellurite for diphtheria, the various typhoid media, etc.

This medium is at present in use in the army laboratories in Palestine, and in our own class work.

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Recommended Qualifications for Public Health Nursing Personnel*

1940-1945

SINCE the publication of "Minimum Qualifications for Those Appointed to Positions in Public Health Nursing" in 1936,† far-reaching developments have taken place that need to be considered in setting new goals for the next five years. The years 1935–1940 have seen the greatest expansion of public health nursing in its history, due in large part to the health provisions of the Social Security Act. Despite the pressing need for nurses to fill available public health nursing positions, there has been an increasing appreciation by administrators of the importance of appointing nurses specifically prepared for the public health nursing field. The Social Security Act has assisted in this trend by making provision for many nurses to get the needed preparation as well as requiring through a later amendment that appointments be made under a merit system of personnel administration.

The completion of the revised *Curriculum Guide for Schools of Nursing* by the National League of Nursing Education in 1937 has given impetus to the enrichment of the undergraduate curriculum so that the nurse may be more adequately prepared to make her contribution to the health and social welfare of the community in whatever field she enters. However, since this requires a faculty prepared to assist in the integration of the health and social aspects of nursing throughout the curriculum, emphasis has been placed increasingly on the importance of faculty preparation in these areas by many schools. Also, it is apparent that the graduates from the schools which offer such an enriched curriculum, with a wide range of clinical experience including communicable and mental diseases, will be considered potentially the most promising for public health nursing service. The membership list of the Association of Collegiate Schools of Nursing and the National League of Nursing Education's list of accredited schools will be helpful in furnishing another basis for the selection of graduate nurses for public health nursing.

The growth of merit systems as a method of selecting personnel both in official and nonofficial agencies has made for greater understanding by agencies and by citizens of the need for specific requirements for the various positions in the field of public health nursing. The qualifications recommended here have been formulated in the light of these present trends in qualifications for public health nurses wherever they may be employed.

Determined effort to reduce further

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* Preliminary Report of the Subcommittee on the Educational Qualifications of Public Health Nurses of the Committee on Professional Education, American Public Health Association.

This Report has been approved by the Education Committee of the National Organization for Public Health Nursing and by the Committee on Professional Education of the A.P.H.A. It is published here to permit the members and Fellows of the Association to review it and to offer criticisms and suggestions prior to its further consideration.

This Report, like all other statements of the committee, on professional and technical qualifications in public health, is subject to periodic revision in order that it may be kept abreast of the best thought.

† Published in *Public Health Nursing*, March, 1936, page 172.

certain existing health problems, such as crippling in children, maternal and neonatal hazards, tuberculosis, and the venereal diseases, has made emphasis on special services in these areas necessary. Each of these is recognized as one part of the whole family health service, and, as such, is most adequately carried on by the field nurse who is responsible for all phases of the public health nursing program. The nurse, however, needs help from consultants who in addition to the necessary equipment as supervisors have had preparation in the special field in which they are engaged.

Mindful of these trends and realizing that the first principle underlying the improvement of service is the appointment of qualified personnel, the Education Committee of the National Organization for Public Health Nursing and the Committee on Professional Education of the American Public Health Association recommend these qualifications for those appointed to public health nursing positions as the goal for 1945. They are based on the principles: (1) that one of the most essential requisites in public health nursing is the ability to work effectively with people, (2) that the public health nurse must be a competent nurse with sound basic theoretical and clinical preparation in nursing and with an understanding of its social and health aspects, (3) that additional study, including supervised field experience, is essential to prepare the graduate nurse for the specific functions of public health nursing, (4) that continued in-service education including qualified supervision (see II, A of outline) is necessary to further the development of the nurse's potentialities for improved service to the individual family and community, which is the goal of all public health nursing.

PERSONAL FACTORS IMPORTANT

While the following qualifications may seem to stress academic preparation and professional experience, personality remains a major factor in successful public health nursing service, and therefore must always be given due consideration. Also, good physical health as determined by a preëmployment examination should be considered essential because without it the other qualifications are rendered less effective.

Improvement in the technic of personal interviews and the collection of credentials, through study of personnel methods in other fields, will help in developing more accurate methods for the selection of applicants with fundamental requisites. Tests and other measurements need to be studied as a means of determining individual abilities and capacities.

On the other hand, it is important for both the nurse and the employer to understand the purpose and value of theoretical preparation for public health nursing. University study should be an economical means to the end of greater competency in daily work and not an end in itself. It is a means for the nurse to review under guidance past and present practice in this field in order to become familiar with sound, workable principles and thereby avoid some of the trial-and-error learning common to all new workers. It is an opportunity to gain additional tools, both in content and method, which will make work in the field more pertinent and more productive.

Unusual competence in the work to which the nurse is assigned is the only sound basis for promotion to greater responsibility, and the one most frequently used. Well utilized graduate study should assist in the development of such competence. The amount of study suggested in these recommended qualifications is believed to represent the minimum needed for each type of worker described.

While these qualifications apply spe-

cifically to new appointees, the importance of corresponding additional preparation for those already appointed should receive careful consideration in relation to each nurse. Under certain conditions, it might be desirable for agencies to adopt a policy urging those appointed within the last few years to meet within a specified period of time the recommended theoretical preparation for the respective positions.

I. STAFF NURSES*

A. *For the nurse working on the staff of an official or private agency under the direct supervision of a nurse supervisor who meets the qualifications herein set forth—*

Duties: To carry on the direct nursing service of the agency in the home, clinic, conference, school, or industry.

Preparation:

1. General education — High school graduation or its educational equivalent which meets college entrance requirements. Education on a college level is desirable.

2. Basic nursing education—Graduation from an accredited† school of nursing connected with a hospital having a daily average of 100 patients, with the necessary affiliation, which gives the nurse a broad clinical experience in medical nursing, including acute communicable disease, tuberculosis, and the venereal diseases; psychiatric and pediatric nursing (including the care of children with orthopedic and cardiac conditions); and an understanding of the social and health aspects of nursing, both physical and mental, through an integrated program of instruction in classroom, ward, outpatient department, with appropriate use of community facilities.

3. State registration.

4. Postgraduate study — Completion of the year's program of study in public health nursing in a university program approved by the National Organization for Public Health Nursing, previous to or within five years after appointment.

B. *For the nurse in an official or private agency not working under direct supervision—*

Duties: In addition to carrying on the direct nursing service of the agency as in A, to assist in organizing the service; to work with lay and professional groups; to carry on the activities in special situations such as the school and industry.

Preparation:

1. General education—Same as listed for staff nurse under A.

2. Basic nursing education—Same as listed for staff nurse under A.

3. State registration.

4. Postgraduate study — Completion of the year's program of study in public health nursing in a university program approved by National Organization for Public Health Nursing, before appointment.

5. Experience—At least one year's experience under qualified nursing supervision in a public health nursing agency in which family health is emphasized.

II. SUPERVISORS AND EXCUTIVES

A. *For the supervisor—*

Duties: To supervise the staff nurses in an official or private agency and to assist in their growth and development; to plan and develop the nursing program for which she is responsible in relation to the total program of the agency; to correlate it with that of other agencies in the educational, social, and health fields; to study and evaluate the program within her own area.

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* See Minimum Qualifications for Nurses Appointed to School Nursing Positions. *Pub. Health Nurs.*, Feb., 1938, p. 108. Also Desirable Qualifications of Nurses Appointed to Public Health Nursing Positions in Industry. *Pub. Health Nurs.*, July, 1939, p. 410 and *A.J.P.H.*, 29, 7:789 (July), 1939.

† Accredited by the state board of nurse examiners.

Preparation:

1. General education—College degree.
2. Basic nursing education—Same as listed for staff nurse under I, A.
3. State registration.
4. Postgraduate study—Same as listed for staff nurse under I, B., and in addition, a course in principles of supervision.
5. Experience—At least two years' experience, one of which was under direct, qualified nursing supervision in a public health nursing service in which family health is emphasized.

B. *For the consultant*—

Duties: To assist in analyzing the needs and developing the service in the special field; to correlate this service with other services offered by the agency and with the programs of other agencies; to advise regarding policies, technics, and procedures in the special field; to participate in the supervisory and staff-education program of the agency in coöperation with the other supervisory personnel.

Preparation:

1. General education—College degree.
2. Basic nursing education—Same as listed for staff nurse under I, A.
3. State registration.
4. Postgraduate study—Same as listed for staff nurse under I, B., and in addition a course in principles of supervision and advanced preparation in the special field, including content in that field, courses in general education, and methods of making and using studies.
5. Experience—At least two years' experience, one of which was under direct, qualified nursing supervision in a public health nursing service in which family health is emphasized, and at least one year's experience as a generalized supervisor.

C. *For the educational director or instructor in public health nursing*—

Duties:

In public health nursing agencies—to plan and to direct the educational program for the new nurse, for the student, and for the staff as a whole, and to correlate and develop the resources of the agency and of related community services for teachnig purposes.

In schools of nursing—to assist in directing, to correlate, and to participate in the efforts to give the undergraduate student the concept of the social and health aspects of nursing, both physical and mental, through an integrated program of instruction in classroom, ward, and outpatient department, with appropriate use of community facilities.

Preparation:

1. General education—College degree.
2. Basic nursing education—Same as listed for staff nurse under I, A.
3. State registration.
4. Postgraduate study—Same as listed for staff nurse under I, B., and in addition, courses in principles of supervision and in the philosophy and principles of education.
5. Experience—At least two years' experience, one of which was under direct, qualified nursing supervision in a public health nursing service in which family health was emphasized, and at least one year's experience as a supervisor in a public health nursing service.

D. *For the director*—

Duties: To administer the nursing service of the official or private agency; to determine with the administrative official or the board the policies and program to be followed; to interpret the needs of the nursing service to the administrative officials, to the board, to committees, and to the community; to participate in community planning and action in health and social welfare.

Preparation:

1. General education—College degree.
2. Basic nursing education—Same as listed for staff nurse under I, A.
3. State registration.

4. Postgraduate study—Same as listed for staff nurse under I, B., and in addition, courses in supervision and in principles of administration.

5. Experience—At least three years' experience, preferably in more than one type of agency—i.e., official and private—including experience in supervision.

E. *For the director of a university program of study*—

Duties: To assume direct responsibility for the planning and administration of the program.

Preparation:

1. General education—Graduate degree.

2. Basic nursing education—Same as listed for staff nurse under I, A.

3. State registration.

4. Postgraduate study—Completion of the year's postgraduate program of study in public health nursing in one of the university programs approved by the National Organization for Public Health Nursing, before appointment, and advanced university courses in general education and in supervision and administration in public health nursing.

5. Experience—A minimum of five years' public health nursing experience, preferably in more than one agency, one year of which should have been in a general public health nursing agency with direct, qualified supervision, emphasizing family health. This experience should include experience as a staff nurse and experience as a supervisor, executive, or educational director.

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Public Health Activities Against Tuberculosis in Mexico*

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WITH its wide variety of living conditions due to altitude, variations in rainfall and other conditions governing agriculture and industries, Mexico has a broad range of tuberculosis rates. The problem can best be evaluated by a study of the death rates of the country as a whole and of the individual states. In general, the high rates are found along the coast of Mexico and along the northern border, while lower rates are the rule in mountain states. Death rates are higher in the large cities than in the smaller towns, with the exception that mining districts often present higher rates than the agricultural regions around them.

TABLE 1

Tuberculosis Mortality in Mexico

Years	*Pulmonary*	*All Forms*
1922	68.23	78.83
1923	27.34	76.06
1924	59.30	68.70
1925	66.28	74.67
1926	58.84	67.22
1927	60.21	66.34
1928	60.80	67.01
1929	61.02	67.67
1930	61.42	68.71
1931	61.82	70.03
1932	74.84	65.72
1933	55.16	61.66
1934	38.16	52.68
1935	39.13	54.27
1936	39.37	54.08
1937	39.36	54.09
1938	.....	55.38

Little can be learned from a study of morbidity as yet, for even in the capital the number of reported cases does not greatly exceed the number of deaths for the same period.

TABLE 2

Tuberculosis Mortality in the Federal District

Years	*No. of Cases Registered*	*Deaths*	*Death Rate Per 100,000*
1934	1,036	1,301	88.11
1935	1,082	1,345	87.89
1936	1,801	1,312	82.73
1937	2,236	1,370	83.36
1938	1,868	1,417	83.19
1939	1,647	1,473	83.44

Some information is contributed by surveys with the use of tuberculin to determine the number of sensitive individuals. The greatest number of these tests has been made in children up to the age of 14 years, using the von Pirquet technic. Three such surveys gave the following results: one of nearly 20,000 school children, one of 4,224, and another of 861 children, all in Mexico City, gave the same percentage of positives, 52 per cent. Results for specific ages are not available. In another series, 14,131 children attending child hygiene centers in Mexico City were tested with the results shown in Table 3.

Of the children with positive von Pirquet who were subsequently exam-

TABLE 3

Tuberculin Test (von Pirquet) in Infants

Age–Years	*No. of Infants Tested*	*Per cent Positive*
0–1	11,036	1.6
1–2	2,087	4.6
2–3	164	11.0
3–4	283	14.8
4–5	297	17.8
5–6	239	15.6
6–7	25	20.0

* Read before the Health Officers Section of the American Public Health Association at the Seventieth Annual Meeting in Atlantic City, N. J., October 16, 1941.

ined by x-ray, 0.4 per cent were found to have active tuberculosis.

Measurements of sensitivity to tuberculin have been made on a limited scale, and they show something of the prevalence of infection with tuberculosis in the capitals of five states, Veracruz, Morelos, Hidalgo, Mexico, and Michoacán, in all of which tests were made with the same technic. A single injection of 0.1 of a 1 to 10,000 dilution of old tuberculin prepared by the National Institute of Hygiene was injected intradermally, and readings were made 48 hours later.

The percentage of positives obtained varied in the age group 5–9 years from 17 per cent in Toluca and Morelia to 28 per cent in Pachuca; in the adolescent group, ages 10–14 years, from 28 per cent in Morelia to 41 per cent in Pachuca; in the young adults, ages 15–29, from 36 per cent in Morelia to 60 per cent in Jalapa; and in the age group 30 years or more from 59 per cent in Morelia to 97 per cent in Jalapa. The numbers examined in these age groups were: in Pachuca 4,264, in Morelia 2,418, in Cuernavaca 366, in Toluca 423, and in Jalapa 622.

Studies of the mortality rates and the scattered tuberculin test indicate that two features which are commonly found in other countries are true of the tuberculosis problem in Mexico; the age group most affected is that of young adults, from 15 to 30 years; and peasants who move to the crowded cities apparently show a greater susceptibility to tuberculosis than those born in the city environment.

These data give a rough sketch of the present tuberculosis problem. Speculation with reference to the causes of low mortality in certain regions and high mortality in other regions may well be postponed until more epidemiologic information is available. In the meantime we shall discuss the steps which have been taken in the past to attack the problem and the recent developments which are intended to provide us with additional knowledge and additional facilities for the control of the disease.

Organized efforts for the reduction of the incidence of tuberculosis have been in operation for about 10 years. The leadership of the agencies involved has been, during the entire time, in the hands of the Division of Tuberculosis of the Federal Department of Health. Responsibility has been shared with the Departments of Public Welfare and Education. In addition, private initiative is represented by a National Tuberculosis Committee. Coördination between governmental and private agencies is assured by the position of the Federal Director of Health as ex officio President of the National Tuberculosis Committee. Yet this committee is autonomous and has its own Board of Trustees, its Bureau of Technical Advisers, its Information and Propaganda Bureau and its Finance Committee, and it has complete responsibility for the handling of its own funds.

The earlier years were devoted to developing the internal organization of the governmental entities associated in the work, to the establishment of the first dispensaries and hospitals, and to the development of clinical methods which would be most effective for large scale operations. During those years the National Tuberculosis Committee was relatively inactive. With the beginning of 1941, the time appeared ripe for the public to take a more direct part in financing anti-tuberculosis activities and there was inaugurated an active campaign which has brought subscriptions of nearly 4,000,000 pesos for the construction of new institutions. The committee recognizes the uncertainty which is associated with occasional drives to obtain financial support, so it is now studying means for obtaining a more regular income with

general participation of all social groups. It has under consideration stamp sales and also a plan for general insurance with special reference to tuberculosis.

The facilities already available for handling cases of tuberculosis include about 1,000 beds in public hospitals, and 100 in private institutions. There are 8 dispensaries for ambulant cases in Mexico City and 25 in the remainder of the Republic. There is also in operation a preventorium of 50 beds maintained by the Federal Department of Education in one of the suburbs of the capital. For a more indirect attack on the problem, systematic educational work is being done by the Department of Public Health in coöperation with the Federal Department of Education. The Department of Labor is taking measures to improve working conditions in industrial districts. The department of Agriculture is encouraging the development of family gardens and the use of more adequate diets in rural territory. The Department of Public Welfare is taking measures to improve the diet of the city residents, including the establishment of large low cost restaurants under the supervision of trained technical personnel. The National Committee on Housing and other organizations are fighting overcrowding and other unhygienic features of home construction. There are other institutions which have great potential value in the fight against tuberculosis and are now ready for mobilization in the attack. Among these are 289 centers of hygiene and health units with 443 physicians and approximately 1,500 nurses and also the coöperative medical groups organized by the Department of Health among small farmers. There are 121 of these groups, with 170 physicians, 10 dentists, and 225 nurses. For case finding and follow-up work in the homes, these groups will be of the greatest value when there are more adequate facilities for treatment. Naturally the work which these groups are doing now against malaria and hookworm disease and in their efforts to improve environmental sanitation will be of great help as adjuncts to the direct efforts against tuberculosis. Public health expenditures in the Republic as a whole have increased in 10 years from $0.08 Mex. to $0.34 per capita for the Republic as a whole.

These are the means with which we expect to work in fighting this scourge in Mexico. Thus far, the actual clinical work has been hard, for the inadequate number of hospital beds has made it necessary to increase the turnover per bed to its maximum. Therefore, the 220 beds in the principal tuberculosis hospital have been used chiefly for surgical treatment, of which the volume is larger per bed than that in similar hospitals elsewhere. The dispensaries have been used for pneumothorax treatment of ambulant cases, and tuberculosis wards in general hospitals for the isolation of advanced cases in their terminal stages. This policy has emphasized the protection of the family by isolating the patient or by rendering his sputum negative, but of necessity it has omitted the provision of long periods of rest for many patients who might have benefited.

Because our campaign is in its early stages, and the public is not yet prepared to take full advantage of it, our clinicians have severe handicaps. Sixty-eight per cent of the patients when first reported show bilateral lesions; 50 per cent show cavities, and nearly 12 per cent present cavities in both lungs. Under such conditions extreme care is necessary in the selection of cases for surgery, and effective use of hospital beds by skillful technic and good judgment is essential.

The Federal Department of Health and the National Tuberculosis Committee feel that the period of develop-

ment of methods and of preliminary organization has been sufficiently extensive and, working together, they are now trying to develop to full capacity all of the resources which are available for their fight against this plague. The program for this year and those immediately following is to be devoted to the building of more hospitals and a rehabilitation farm in the Federal District, with an additional sanatorium for each of our coastal regions, at a total cost of about 5,000,000 pesos.

The program will increase the number of available beds by about 1,700, all of them devoted exclusively to the care of patients suffering from tuberculosis.

This is the situation of Mexico, so far as tuberculosis is concerned, and upon these plans we base our hopes for a better country and a healthier and happier people, your neighbor, your brother in ideals, in creeds and in thought, for a united and civilized American Continent.

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THE BROAD VISIONED LAYMAN AS AN AID IN PLANNING

PERHAPS one of the shrewdest observers and interpreters of current events and affairs is Mr. Raymond Clapper, the columnist. Though occasionally he builds a fire under the near great or even the great, usually he writes in a restrained manner, free of the omniscience and cocksureness to which many columnists are addicted. In connection with the war effort in general, and in particular relation to production, he made this comment in the June second issue of the *New York World-Telegram*, "The expert again has been caught with his nose so deep down in the details and in traditional ways of operation that he missed the possibilities. Experts are indispensable. They are the fellows who get the job done. But sometimes it has to be started by the outsider who is just too ignorant to know about all of the difficulties. He hasn't sense enough to know there is a limit to what can be done, and, sure enough, time and again he turns out to have been nearer right than the men who knew all about it."

One cannot but agree that this observation is sound as regards plans for expansion of public health work after the war. Those who are in the thick of public health activities are rated experts and possibly, as such, are inclined to resent comments and suggestions from outsiders. But an inevitable cost for expertness is to be found in a lack of perspective, particularly as this perspective relates to broader issues. The expert is so occupied in the precise measuring or routine felling of individual trees that the direction of the prevailing wind and the position and significance of the woods in question are likely to go unobserved. In contrast, it is not an uncommon experience of health experts, in dealing with those whom they consider laymen, to obtain now and then some shrewd observation, apparently quite naive in its inception, which disposes of a great writhing mass of questions for which the experts could find no common answer. In similar situations, too, one hears from time to time lay suggestions which, beeause of simplicity and boldness, we in public health would never have considered as a possible course of action. Now two things may be done in such circumstances. One might exhibit the tired tolerance of the professional for the amateur, and

indicate that fools may ask questions beyond the ability of the wise to answer; or due consideration may be given to each such suggestion which carries merit, regardless of its source and, most of all, regardless of its orthodoxy.

Not only do we recommend the latter course, but further we urge on public health experts the discussion of their post-war plans, large or small, with intelligent laymen who in their own fields have encountered problems generically the same. Obviously, the lawyer would not know much about viruses or vitamins, but in applied psychology he could give most professionals all the aces in the deck and beat them hands down. At the other end of the scale are those in the exact sciences, who generally know things rather than people. Behind them is such a rigid discipline of training, and in their daily work they must exhibit such an exactness of thought, that their basic-principle ideas may safely and productively carry over into fields outside their immediate specialties. Similar observations might be made on benefits to be derived from conference with the historian, the educator, the industrialist, the labor leader, the plain businessman; and if one in health work wants really to feel the public pulse and see his problems and plans as others see them, let him talk with the taxi driver, the tenant farmer, the man with the shovel, the butcher's boy.

We need these associations in our planning for the future. Naturally, from them would come many crack-pot suggestions. Sheer ignorance and stupidity would occasionally give rise to puerile observations, and prejudices would not infrequently color the advice that one got. Nevertheless there would be much that is worth while if one chose his consultants wisely, and the fresh viewpoints and unfettered suggestions thus obtained would stimulate the expert to strike out for far horizons. A good mind is worth exploring, regardless of whether that mind is in the skull of a banker, a businessman, or even a politician.

THE NEED FOR CONTINUING STUDY

NO inconsiderable part of the scholar's armamentarium is the knowledge of where to look for information, and the availability of texts, monographs, journals, reprints, etc., when wanted. For one whose work is in a university or a large health department with library facilities, this matter of getting information is made amazingly easy. Discussions with his associates, with visiting colleagues, an abundant supply of periodicals, shelves of rich source materials, current indices, and even bibliographic and abstract service make reception of current and past knowledge easier than remaining uninformed.

One who lives in such circumstances is, therefore, likely to forget the plight of those laboring on the far frontiers of public health work: the medical officers of health, the public health nurses, the engineers, and others on the staffs of rural health departments. Seldom do these people have the stimulating experience of visitors and, outside of their immediate staff associates, there are not locally any others in their respective professions who are engaged in public health work. Their reading material, with few exceptions, is limited to such books and professional journals as they might be able to pay for from their own slim salaries. Their departmental budgets fit their programs with skin-tightness, and there is no slack for purchase of reference texts or periodicals. Even when at the end of the year there is some unlooked for balance in the contingent or miscellaneous fund, the

local agency lacks authority to spend it for such a luxurious purpose as books—or is too hard pressed by some other need even to consider an expenditure for this purpose.

We know too much of the rural budget and of state and local problems to visualize or advocate a library in each small health department. Yet we know, too, that continuing study and current reading is an acute need of those who work, unsung, in difficult circumstances. And we feel that the situation is worse than it need be. It is deficient not because of any opposition to it by those higher up, but rather because there has been a tendency to overlook it under the necessity of meeting demand services. In all fairness, too, it must be said that some state health departments are trying to overcome the situation through news letters, a central lending library, institutes, and regional conferences. These measures help, but after all they do not serve the same purpose as readily available books and regularly received journals. Would it be stretching too far the definitions of "equipment" or "supplies" or "upkeep" to consider books and journals as coming under one of these budgetary headings? In the end it is just as important, possibly even more important, to feed the minds of the staff as it is to get furniture for the office, provide coal for the furnace, or repaint the front door.

WHAT AND WHO IS AN EPIDEMIOLOGIST?

Comments on an editorial published in the April, 1942, issue of the JOURNAL:

From Ralph E. Wheeler, M.D., of Vanderbilt University Medical School, comes this comment:

"Like his prototype, the clinician, the epidemiologist (the 'Doctor' of actually or potentially sick *groups of human beings*) is an observer with many strings to his bow. First of all he is clinician enough to be able to identify ailments by making and evaluating observations in a wide variety of fields—history, physical and laboratory—as they apply to the individual. If he can't actually make these observations he at least knows enough about making them so that he can 'ride herd' upon those who do. Second, he is statistical analyst enough to use statistics where their use is indicated in the collective field: primarily to find groups maximally at risk. The rate, commonly used to express this risk, is not a bad shibboleth by which to test the genuineness of one who calls himself an epidemiologist. If he quibbles mightily over the numerator and grabs up anything that offers for a denominator, he is really a clinician at heart. If he accepts anything that offers—be it only reported cases—for the numerator and bickers endlessly over the denominator he is probably a biostatistician. If he frets indefinitely over both numerator and denominator he is more likely to be an epidemiologist. It is not possible to say that individuals in this latter category *are* epidemiologists because clinical and statistical ability are but two of the necessary qualifications. With these two skills alone one can merely explore ways of transmission (or risk) of manifest illness in gross categories. Finer categories of susceptibility are available through the laboratory where confirmatory evidence on suspected modes of transmission and *sources* may

also be identified. Nor can the word 'laboratory' be construed too narrowly: bacteriology, chemistry, parasitology, and physics contribute their share.

"Beside having clinical, statistical and various laboratory facets the epidemiologist is a basic observer in other fields—at least trained and experienced—in sanitation and sociology. General biology and geology as hobbies suddenly loom large as professional aptitudes at times.

"In the broad warfare on disease, the epidemiologist leads task forces against particular objectives. He adapts his forces to the nature of the objective. To get the most out of each weapon at his disposal, he should have had both training and experience in its use."

M. J. Rosenau, M.D., of the School of Public Health, University of North Carolina, has this to say:

"An epidemiologist is a disease detective. This definition would not suit an historical epidemiologist, and on the other hand a statistical epidemiologist would have difficulty in fitting a curve to any definition supplied by an experimental epidemiologist. An applied epidemiologist who looks practical realities in the face would consider any definition of the other kinds of epidemiologists as a description rather than as a definition. Anyhow, a shoeleather epidemiologist would have no quarrel with Dr. Watson if he called him a disease detective."

C.-E. A. Winslow, Dr.P.H., Professor of Public Health, Yale University School of Medicine, contributes the following comment:

"The question raised by your editorial 'What and Who Is an Epidemiologist?' can, I think, only be answered in rather broad terms. I think anyone may claim this title who is either advancing or applying knowledge in relation to the causation and control of herd diseases (not necessarily limited to those of microbic origin). There are at least three major lines along which knowledge of this kind may be developed; statistical epidemiology, clinical case studies (as developed by Opie and Paul), and experimental epidemiology—just as in chemistry we may have physical chemists and physiological chemists. Except in the field of experimental epidemiology we must include both those who contribute to basic scientific knowledge, and those who apply such knowledge in the field of health department practice. A scholar who analyzes the history of epidemiological thinking certainly deserves a place in the scheme, and so does the health official working in the field of communicable disease control—at least if his applications are made on the basis of the best available fundamental knowledge. In the area of either theory or practice he should have special training, but we cannot exclude those who have obtained this training by the road of arduous experience."

BOOKS AND REPORTS

Four Treatises of Theophrastus von Hohenheim Called Paracelsus—*Translated from the original German, with introductory Essays by C. Lilian Temkin, George Rosen, Gregory Zilboorg, Henry E. Sigerist—Edited, with a preface, by Henry E. Sigerist. Baltimore: Johns Hopkins Press,* 1941. 256 pp. Price, $3.00.

One of the most influential nonconformists in science was the Swiss physician Paracelsus (1493–1541). His bitter opposition to the then current orthodox medical canon had little influence at his time. His ideas, however, powerfully assisted in 16th and 17th century application of chemistry to medical practice. His semi-mystical speculation made him a hero to many 19th century Romantics.

Dr. Temkin's translation of the *Sieben Defensiones* offers an excellent personal picture of Paracelsus and his ideas. Dr. George Rosen's translation of *Von der Bergsucht und andern Bergkrankheiten drei Bücher* is a significant interpretation of the first important treatise on occupational diseases. From his personal experiences, Paracelsus had direct acquaintance with miners' diseases and his observations constitute the origin of industrial medicine and hygiene. Paracelsus realized the importance of what we would now term "public health measures." Unfortunately he seemed to have no practical suggestions for preventing the conditions he described so well.

Another pioneering work of Paracelsus in his *Von den Krankheiten, so die Vernunft berauben,* translated here by the psychiatry historian, Dr. Gregory Zilboorg. This deals with mental disorders and in many ways seems to anticipate modern views. Contrary as usual to the then customary belief, Paracelsus approached mental disorder in a rationalistic manner, relatively free from demonism, and based on his own experiences. He appreciated the significance of unconscious and sexual factors in mental disorder, and otherwise showed many manifestations of modern psychiatry trends.

Dr. Sigerist translates the poetic *Liber de nymphis, sylphis, pygmaeis et salamandris et de caeteris spiritibus.* This is one of the most artistic and philosophical of the writings of Paracelsus, but also one of the most difficult to appraise.

For the practical public health worker of today, the treatises *On the Miners' Sickness* and *On Diseases that Deprive Man of His Reason* are the contributions of Paracelsus most likely to hold interest. Dr. Sigerist and his associates deserve appreciative congratulations on issuing this important historical study at this time. CHAUNCEY D. LEAKE

Doctors Anonymous — *The Story of Laboratory Medicine—By William McKee German, M.D. New York: Duell, Sloan and Pearce,* 1941. 300 pp. Price, $2.75.

In this book the author makes a convincing plea for the recognition of the pathologist, who, he says, is "the unknown man of medicine," yet much of the diagnosis of disease and a great deal of the treatment are based on his discoveries and findings. He has no desire to exalt the pathologist unduly since no one specialty in medicine is greater than the others, all parts functioning together for a real scientific life. A history of the past 50 years, which covers pretty well the time since modern pathology had its birth, is particularly good reading, informative, and dramatic.

Every physician knows the value of

the post-mortem and is aware of the many superstitions which existed and blunders made before study of disease in the cadaver was allowable. Every honest physician knows of blunders in diagnosis which could have been avoided by bacteriological and pathological tests.

In surgery the frozen section done on the spot often determines the extent and character of the operation. The many facts brought forward in the numerous case histories cited are convincing arguments for the greater recognition of the part played by the pathologist in the everyday practice of medicine. This was recognized by the American Medical Association and the American Society of Clinical Pathologists; so in 1936 the American Board of Pathology was incorporated with authority to issue certificates of proficiency in the special field of pathology to those meeting the required standards.

In spite of what we know, a recent survey, 1939, shows that there are only 4,673 departments of pathology in the 6,166 approved hospitals, and these were directed by only 3,601 medical graduates, the conclusion being that only about one-fifth of these men have qualifications equal to those required for certification by the American Board of Pathology.

The pathologist is important from other standpoints. Too many cases of murder—poisoning, for example—have gotten by through lack of proper examination by a trained man—" Crime without punishment." The author takes a well deserved slap at what he calls " coroner's thrombosis," a diagnosis made from superficial examination.

The book is also of necessity more or less a study of human nature as discussed under " Fads, Fashions and Disease." A slap is also made at medical ethics which too often interfere with the correction of blunders. The author asks " ethics or diagnostics? "

Though the book is evidently intended for the public, the doctor is not neglected. It is pleasantly written and, with the exception of one chapter, can be understood by the public. Modern medicine is likened to a tree—the trunk and branches suggest clinical medicine; the roots, invisible below the soil, are the science of the laboratory. They all go, however, to the formation of the same living, growing thing.

The book can be commended without hesitation. The printing and make-up are excellent. The author has fallen in with the fad of having an introduction by a popular writer. Once again let us impress on the writing public that " Good wine needs no bush."

MAZŸCK P. RAVENEL

Industrial Waste Treatment Practice—*By E. F. Eldridge. New York: McGraw-Hill,* 1942. 401 pp. Price, $5.00.

This book is based on industrial waste data collected by the author as research associate of the Engineering Experiment Station at Michigan State College. Some of the material was originally published in 1938 in *Bulletin 82* of the Station. The book greatly enlarges and revises the data in this bulletin and brings between two covers the most complete and authoritative discussion of industrial wastes published. For some years there has been need for just such a volume as this—one that will serve as a guide to engineers and plant operators faced with industrial waste problems.

The book devotes a chapter to each industry in the United States contributing troublesome industrial wastes. These include wastes from beet sugar, milk, canneries, tanning processes, pulp and paper mills, textile mills, meat and slaughter houses, laundries, metal industries, gas and coke manufacturing, fermentation wastes and oil. In each chapter the manufacturing processes are described, the composition of the waste

materials given, and treatment processes and sludge disposal methods discussed. That the author has done well with his subject is well exemplified in his handling of the complicated and varied processes in textile manufacturing.

The value of the book is enhanced by chapters on the industrial waste problem, general stream pollution theory, the characteristics of industrial wastes, standard methods, structures and equipment employed in general sewage treatment practice, the laboratory analysis of industrial wastes, and a chapter on the treatment of domestic sewage when combined with industrial wastes. This last chapter is one of the most useful in the book and might profitably be enlarged in the next edition.

Analytical procedures for biochemical oxygen demand, suspended solids, acids and iron in pickling liquors, chlorine demand, cyanide, phenol, oil and grease as found in industrial wastes are included in a separate chapter. Emphasis is placed on determinations of biochemical oxygen demand and suspended solids as being of the most significance in indicating the strength of industrial wastes. The need of diluting many industrial wastes before determining the suspended solids by the Gooch crucible method is mentioned, and the steps to be followed are given. It would seem that the substitution of the Buchner funnel for the Gooch crucible might be an alternative.

The explanation of E. B. Mallory's activated sludge theory in the chapter on methods of sewage treatment is the clearest published and it will surprise the reader to find it in such detail in a book on industrial wastes.

The author quotes J. K. Hoskins as concluding that the organic pollution contributed by industry is about equal to that contributed by the entire population. Eventually industry will be required to go as far with waste treatment as has been expected of municipalities in the treatment of sewage. The book in outlining the methods of industrial waste treatment now available is a valuable contribution to the sanitary engineering field.

LEROY W. VAN KLEECK

The Golden Jubilee of the Association of Military Surgeons of the United States — A History of Its First Half Century, 1891–1941—*By Edgar Erskine Hume, Colonel, Medical Corps, United States Army. Washington: Association of Military Surgeons*, 1941. 371 pp. Price, $2.00.

Under the leadership of Dr. Nicholas Senn, a brilliant surgeon of Chicago and a prominent Surgeon in the National Guard, the Association of Military Surgeons of the United States was founded in Chicago during September, 1891. Those participating in the founding were National Guard Surgeons from several states. In this volume the author presents an interesting history of the association.

The Association of Military Surgeons of the United States has played an important part in developing and maintaining interest in medical military preparedness among the medical profession in this country during the past half-century. This is a worth while contribution for military medicine is a distinct specialty. Physicians and dentists, however thoroughly grounded in their professional work, must receive special training in order to fit them for service with the military and naval forces.

This history, dealing with the first 50 years of the work of the association, presents a complete, chronological account of the founding, the annual meetings, and the other events of importance in the affairs of the organization. Photographic cuts of all the presidents, editors, as well as facsimiles of documents and title pages of historical interest are included. The official journal of the association has been published

under one title or another since the founding of the association in 1891. The present name, "The Military Surgeon," has been used since 1901.

Colonel Edgar Erskine Hume, a distinguished officer of the Medical Corps of the Regular Army, the author of this history, is unusually well qualified to serve as a historian for the association. He has been a member of the organization for some 25 years. During about half of that time he has held office or served on the Executive Council. He has attended 20 of the 47 annual meetings, and has been personally acquainted with a majority of the men who have held office in the association. Colonel Hume has also represented the association at several international meetings of military surgeons held abroad and in the United States.

This is a valuable handbook where may be found in readable and compact form the essential facts relating to the Association of Military Surgeons.

R. C. WILLIAMS

Fatigue of Workers, Its Relation to Industrial Production — *By the Committee on Work in Industry of the National Research Council. New York: Reinhold,* 1941. 165 pp. Price, $2.50.

This book is a report of the hearings of the above committee summarized and presented in an interesting manner by George C. Homans. The title of the report is misleading since it does not deal with fatigue, as usually implied by this term, but with the psychological and sociological factors which control the output of industrial employees and their attitude to work and management.

The first section, which is quite unrelated to the remainder of the book, presents briefly the experimental studies of Dill and McFarland on the effects of heat and high altitude. In the next section, clinical psychoneurotic conditions which may result from industrial maladjustments are illustrated in three cases studied by Dr. Canby Robinson.

The greater part of the report is devoted to studies, made by the Western Electric Company, of a selected group of employees over a period of years. The output of the workers was shown to be far less affected by the physical environment, hours of work, etc., than by psychological factors and the social conditions of work. The studies emphasized the need of workers to self-expression which resulted in the formation of informal organizations by the employees. These controlled their output, behavior, etc. The personal interview and other methods used by the Western Electric Company to produce a closer association between management and employees are discussed.

Labor's viewpoint on self-expression and labor unions is represented by Harold Ruttenberg. Problems involved in setting output standards and time allowances for tasks are discussed by Dr. Jacob Blair. The final section is a review of Chester Barnard's book *The Functions of the Executive.*

This report is very timely since it presents scientifically the fundamental problems which control industrial relations and output. ANNA M. BAETJER

Stedman's Shorter Medical Dictionary — *By Thomas L. Stedman. Chicago: American Publishers Association,* 1942. 277 pp. Price, $2.50.

A "completely revised and enlarged" edition of this widely circulated dictionary should be as useful for most purposes as the unabridged edition. However, it is regrettable that the information on the acute communicable diseases apparently has not been brought up to date since the death of Dr. Stedman and should certainly be brought into conformity with the official report of the American Public Health Association.

REGINALD M. ATWATER

Heating, Ventilating, Air Conditioning Guide *(20th ed.)—New York: American Society of Heating and Ventilating Engineers,* 1942. 1,136 pp. Price, $5.00.

This volume presents, in accordance with its established policy, the latest authoritative information of value to heating, ventilating, and air conditioning engineers. Many changes have been made in the text material; new material where such was available has been added; and a new chapter on fundamentals of heat transfer has been included. As before, the volume is divided into several sections dealing, in general, with types of heating, cooling, and air conditioning systems and their control, as well as the fundamental thermodynamic principles and their application to this field. Numerous examples are given illustrating methods of computation, and, as in previous editions, there is included a Manufacturers' Catalog Data Section describing available equipment. C. P. STRAUB

Proceedings and Papers of the Twelfth Annual Conference of the California Mosquito Control Association—*Notes and Transcription by Margaret A. Prefontaine, Edited by Harold Farnsworth Gray. Richard F. Peters, Secretary-Treasurer, 3093 Life Sciences Building, Berkeley, California,* 1941. 143 pp. (with notes on the identification of California mosquitoes by William C. Reeves). Price, $1.00.

The proceedings of the Conference were divided, in effect, into four symposia; namely, encephalitis in California, mosquito control in relation to national defense, new information on the entomology of mosquitoes, and mosquito control operations in California. Only the symposium on encephalitis lends itself to review, and its three interesting papers should be read in the original.

Serological surveys indicate the establishment and coexistence of western equine and St. Louis virus in rural, agricultural sections of the central valley of California where the encephalitides they cause are endemic, as well as in supposedly non-endemic (coastal) areas and Yakima Valley in Washington. Evidently the St. Louis virus has been present for some time and not recently imported as supposed formerly. Antibodies for the western type virus predominate in humans, horses, domestic fowls, and wild rodents, but antibodies for both types are found frequently in the same animal, particularly in horses.

There is a definite seasonal prevalence of encephalitis in horses and man, with the peak of incidence being reached in late summer and the peak for horses usually preceding that for man. Evidence is presented that transmission is probably from domestic animals to a biting insect to man. While ticks *(Dermacentor andersoni)* and the cone-nosed bug *(Triatoma sanguisuga)* may be natural vectors of western virus, it is probable that mosquitoes are the principal vectors. Mosquitoes of the genus *Aedes* can transmit western equine virus and *Culex tarsalis* have been found infected naturally with both western and St. Louis viruses. Epidemiological evidence apparently incriminates the latter mosquito. There may be more than one mosquito vector, and possibly special vectors from animal to man and from animal to animal. However, the transfer of viruses in nasal secretions has not yet been ruled out.

ROBERT BRIGGS WATSON

Food and Drug Regulations—*By Stephen Wilson. Washington: American Council on Public Affairs* (2153 Florida Ave.), 1942. 177 pp. Price, $3.25 (cloth); $2.50 (paper).

From the opening statement of the introduction by Professor W. H. Hamilton to the last sentence of the final

chapter, this book is replete with important facts, incidents, and excerpts of debates leading up to and through the passing of both Federal Food and Drug Acts of 1906 and 1938. One chapter is devoted to the history of food and drug legislation from the days of the Athenians and Romans to the passage of the Pure Food and Drug Act of 1906. Then follow three chapters of the history of this latter Act, its difficulty in administration, and its weaknesses. The campaign for a new federal food, drug and cosmetic law with its ultimate passage in 1938 and its causes and consequences are discussed in the last three chapters.

This book should be obtained by every food and drug control official because it is a complete story of food and drug legislation of the federal government. There are practically no errors in printing, the type is clear and easily readable, and there are many references.

No mention however, is made of state and local food and drug legislation. The title of the book, therefore, could very well be, "Federal Food and Drug Regulations." FERDINAND A. KORFF

Superior Children through Modern Nutrition—*By I. Newton Kugelmass, M.D. New York: Dutton*, 1942. 332 pp. Price, $3.50.

In this book intended for laymen, the author strives for erudition. For example, among the vitamins he lists vitamins I, J, L, M, P, T, U, and W, attributing to some of them an importance in human nutrition not yet proved.

His data vary each time he quotes figures. The vitamin A content of a quart of milk is given on page 29 as 150 units, whereas on page 34 a pint of milk is stated to yield 1,000 units; in the table on page 37 one "serving" of milk contains 720 units, while in the table on page 317 one serving contains 570 units. The book contains many similarly careless statements.

Such pseudoscientific pronouncements as the following are unacceptable. "Does nursing sap a mother's strength? . . . Since breast milk is derived from nutrients in the mother's blood there is no depletion of strength, but only extra utilization of her daily diet" (page 122). "When a solid food is offered for the first time and the infant refuses or vomits it, the probability is that his organism is allergic to this food and unable to utilize it properly" (page 222). "Without the right start during the formative months of fetal life, a lifetime of nutritional devotion to the cause of good teeth will not correct this maternal mistake" (page 95). "In fact the child on an ordinary diet only develops his optimal quota of brain well after the sixth year. If breast fed his intelligence quotient is apt to be higher than if artificially fed because breast milk contains 100 per cent more galactose than cow's milk" (page 89).

Undue stress is placed on the prevention of constipation. Among the many references to this condition is found the statement (page 227), "Constipation in the infant is inevitable if little importance has been attached to emptying the bowel or insufficient time devoted to this act. Bowel control may be instituted by proper training during the first months of life." The giving of prune juice is advised as early as two weeks of age for the prevention of constipation; the use of orange juice for its vitamin C content is recommended in the first week of life on page 46, whereas the feeding schedule on page 182 advocates it at one month of age.

The defects of this book tend to outweigh the usefulness of other portions. Because the uninformed mother cannot distinguish between fact and fiction in the field of childhood nutrition, the book is not to be recommended.

P. C. JEANS

BOOKS RECEIVED

SEROLOGY IN SYPHILIS CONTROL. Principles of Sensitivity and Specificity. By Reuben L. Kahn. Baltimore: Williams & Wilkins, 1942. 206 pp. Price, $3.00.

ANATOMY AND PHYSIOLOGY FOR NURSES. By W. Gordon Sears. Baltimore: Williams & Wilkins, 1942. 376 pp. Price, $2.50.

PERSONAL AND COMMUNITY HEALTH. By C. E. Turner. 6th ed. St. Louis: Mosby, 1942. 652 pp. Price, $3.50.

NURSING—AN ART AND A SCIENCE. By Margaret A. Tracy. 2d ed. St. Louis: Mosby, 1942. 754 pp. Price, $3.50.

CHEMISTRY AND PHYSIOLOGY OF THE VITAMINS. By H. R. Rosenberg. New York: Interscience, 1942. 674 pp. Price, $12.00.

MEMORABLE DAYS IN MEDICINE. By Apul F. and Alice Schiedt Clark. Madison: University of Wisconsin Press, 1942. 305 pp. Price, $2.00.

HUGHES PRACTICE OF MEDICINE. Revised and edited by Burgess Gordon. 16th ed. Philadelphia: Blakiston, 1942. 791 pp. Price, $5.75.

THE MEN WHO MAKE THE FUTURE. By Bruce Bliven. New York: Duell, Sloan and Pearce, 1942. 325 pp. Price, $2.75.

HISTORY OF THE SCHOOL OF NURSING OF THE PRESBYTERIAN HOSPITAL, NEW YORK, 1892–1942. By Eleanor Lee. New York: Putnam, 1942. 286 pp. Price, $3.50.

PERSONALITY AND MENTAL ILLNESS. By John Bowlby. New York: Emerson, 1942. 280 pp. Price, $2.75.

SOLVING SCHOOL HEALTH PROBLEMS. By Dorothy B. Nyswander. New York: Commonwealth, 1942. 377 pp. Price, $2.00.

HEALTH IN SCHOOLS. TWENTIETH YEARBOOK. Washington: American Association of School Administrators, 1942. 544 pp. Price, $2.00.

AMERICAN POCKET MEDICAL DICTIONARY. By W. A. Newman Dorland. 17th ed. Philadelphia: Saunders, 1942. 1037 pp. Plain edition, $2.00; Thumb Indexed, $2.50.

ESSENTIALS OF NURSING. By Helen Young and Associates. New York: Putnam, 1942. 609 pp. Price, $3.00.

ANNUAL REVIEW OF PHYSIOLOGY. Vol. IV. James Murray Luck, Editor. Stanford University, Annual Reviews, 1942. 709 pp. Price, $5.00.

MANUAL FOR THE CONDUCT OF CLASSES FOR EXPECTANT PARENTS. By Ellen D. Nicely and Assistants. Cleveland: Cleveland Child Health Association, 1942. 167 pp. Price, $1.50.

SEX GUIDANCE IN FAMILY LIFE EDUCATION. By Frances Bruce Strain. New York: Macmillan, 1942. 340 pp. Price, $2.25.

THE PEOPLE AGAINST TUBERCULOSIS. THE STORY OF THE CHRISTMAS SEAL. By Leigh Mitchell Hodges. New York: National Tuberculosis Association, 1942. 54 pp. Price, $1.00.

NURSING OF CHILDREN. By Gladys Sellew. 5th ed. Philadelphia: Saunders, 1942. 579 pp. Price, $2.75.

THE LIFE OF FLORENCE NIGHTINGALE. By Sir Edward Cook. New York: Macmillan, 1942. (1 Vol. reissue.) 510 pp. Price, $4.50.

HELP YOUR DOCTOR TO HELP YOU SERIES. Heart Disease, High Blood Pressure, Constipation, Insomnia. New York: Harper, 1942. Each $.95.

TRAINING MANUAL FOR AUXILIARY FIREMEN. Boston: National Fire Protection Association, 1942. 406 pp. Price, $1.50.

A HANDBOOK FOR ASSISTANT MEDICAL OFFICERS OF HEALTH ON CHILD WELFARE AND SCHOOL MEDICAL WORK. By F. J. G. Lishman. London: Lewis, 1942. 63 pp. Price, $1.50.

AMERICAN FOUNDATIONS AND THEIR FIELDS. Compiled by Geneva Seybold. New York: Raymond Rich Associates, 1942. 274 pp.

W. K. KELLOGG FOUNDATION. THE FIRST ELEVEN YEARS, 1930–1941. Battle Creek: Trustees of the W. K. Kellogg Foundation, 1942. 217 pp.

A SELECTED PUBLIC HEALTH BIBLIOGRAPHY WITH ANNOTATIONS

RAYMOND S. PATTERSON, PH.D.

Federal Venereal Disease Program in Action—In this series is told what the War and Navy Departments and the U. S. Public Health Service and the Social Protection Section of the Defense Health and Welfare Services are doing about controlling syphilis and gonorrhea.

ANON. (Four papers) Fit to Fight—and Fit for Life, "Best Traditions of the Service . . .," "Health Is the States' Foundation . . .," Safeguards Plus Salvage. J. Social Hyg. 28, 1:3 (Jan.), 1942.

Venereal Disease among Industrial Workers—Four and a half per cent of the first million draft selectees had syphilis. One of every 42 in the general population has the disease now. How great is the loss of time and efficiency due to the disease we shall never know, but it is evident that public health administrators, employers, and employees ought to be on the job preventing that loss. "In time of peace industrial hygiene is a tool. In time of war, we must make it a weapon."

ANON. Health Builds Manpower. (An editorial summarizing seven papers on V. D. in industry.) J. Social Hyg. 28, 2:108 (Feb.), 1942.

Vitamins Important? So Are Emotions—Six articles giving a bird's eye view of nutrition with a mental health slant, prepared primarily for classroom teachers, but of equal value for health educators, full- or part-time.

BINGER, C. A Word to Teachers About Eating Habits (and five related papers). Understanding the Child 9, 1:3 (Apr.), 1942.

Some Light upon the Great Darkness—We may consider the possibility now of preventing several forms of cancer in man by attacking the disease at its origin instead of remaining on the defensive until the disease has opened the attack. This is the hopeful conclusion of an able discussion of the question, Why does a patient get cancer?

CRAMER, W. The Origin of Cancer. J.A.M.A. 119, 4:309 (May 23), 1942.

About Leeuwenhoek, *et al.*—In this discourse covering four and a half centuries of public health and the place of the laboratory at the end of that time, there is much quotable material. One nugget: "We do not want too many epidemiologists whose chief functions . . . are the compiling of convincing itineraries to cover where they went and what they did on their latest peregrination,. . ."

DOLMAN, C. E. The Changing Place of the Laboratory in Public Health. Canad. Pub. Health J. 33, 5:185 (May), 1942.

Today's Lepers Are Lucky—As the day may come when you may have need to tell someone this reassuring story, make a note that there is available an excellent description of the modern leprosarium at Carville. Each year from 40 to 60 new cases are discovered and admitted.

FAGET, G. H. The Story of the National Leprosarium (U. S. Marine Hospital) Carville, Louisiana. Pub. Health Rep. 57, 18:641 (May 1), 1942.

Laboratory Note—Chicks are recommended as a substitute for rabbits or guinea pigs in testing virulence of the diphtheria bacillus.

FROBISHER, M., JR., *et al.* The Use of Chicks in Testing the Virulence of *Corynebacterium diphtheriae*. Am. J. Hyg. 35, 3:381 (May), 1942.

For Radium Dial Painters—Increased demand for luminous dials and time pieces has put radium painting on a broader scale. With properly vented work tables and established safe shop practices, it can be done without jeopardy to health and life. This article tells how.

HEMEON, W. C. L., and EVANS, R. D. Ventilation Requirements for Radium Dial Painting. J. Indust. Hyg. & Toxicol. 24, 5:116 (May), 1942.

Shall We Save Children's Teeth?—After age six, so dental surveys have shown, permanent teeth are attacked at a constant rate of three-fourths of a tooth per child per year. Thirty million children would accumulate 22,500,000 carious teeth each year, but they could be cared for with only 18 per cent of the American dentists' available time and the more important prophylactic work need not take a disproportionate share of this time either. Many public health officials assume that the job to be done is too great, and the cost prohibitive, so they do nothing. This paper persuasively proposes that as something can be done, something should be done to tackle the job realistically.

KNUTSON, J. W. Appraising the Dental Health Program. J. Am. Dental Assoc. 29, 4:543 (Apr.), 1942.

Polio Epidemic Studied—Epidemiologic evidence indicates that, during one poliomyelitis outbreak, the infection was spread mainly not by contact but by certain vectors unknown. Animals, houseflies, blowflies, mosquitoes, and fleas are considered as possible vectors. On the whole, the picture indicated spread of infection by place rather than person.

LUMSDEN, L. L. An Epidemiological Study of Poliomyelitis in Mississippi in 1941. Pub. Health Rep. 57, 20:729 (May 15), 1942.

Contacts, Not Fomites, Spread Scabies—Three British papers on the transmission, the treatment and the control of scabies will interest those of us who may be pestered with the control of this condition. Evidently in England there has been an increase in the endemic infestation. Recognition of early cases and control of carriers, rather than fomites, are the great needs.

MELLANBY, K., *et al.* Transmission and Prevention of Scabies (and two related papers). Public Health 40, 8:150 (May), 1942.

Rejectees with Syphilis and Gonorrhea—In one state, public health nurses are assigned to the army induction stations where all selectees are examined. A quick blood test and a microscopic examination inform the authorities in a few hours which of the selectees are venereally infected. Before each of these leaves the station he is interviewed by the nurse, plans are made for his treatment, and information about the source of infection is obtained. Would that every state did as much!

MOORE, H. B., and DILL, E. R. Venereal Disease Program for Rejectees. Pub. Health Nurs. 34, 5:266 (May), 1942.

Public Health in the War—Today health agencies face their supreme test, that of adapting themselves to broader purposes than that for which they were organized, concludes the Surgeon General. What he has to say to the Conference of State and Territorial Health Officers suggests that some of us are not making too successful a beginning on meeting that supreme test. If you haven't already done so, read this paper, and the proceedings of the conference which follow it.

PARRAN, T. Opening Remarks to the Fortieth Annual Conference of the United States Public Health Service with the Conference of State and Territorial Health Officers. Pub. Health Rep. 57, 19:691 (May 8), 1942.

Lily Painting Department—Here is proof that the risk of tuberculosis

is very great for colored associates of sputum positive cases—if you should be in need of this proof.

PUFFER, R. R., *et al.* Tuberculosis Studies in Tennessee. Am. J. Hyg. 35, 3:367 (May), 1942.

First Aid Treatment for Gas—What to do—and emphatically what not to do—in giving first aid to victims of lung irritants, mustard and tear gases, nerve and blood poisons, carbon monoxide, and phosphorus. Certainly every health worker should be ready with this information, and this is an excellent article.

WAITT, A. H. War Gas Cases. Am. J. Nurs. 42, 5:489 (May), 1942.

Proprietary Vitamin Products—Although the needed intake of the vitamin B complex may be obtained from a satisfactory diet of ordinarily obtainable foods, many American diets are low in this essential. A survey of a number of vitamin B preparations indicates that many of them are wholly inadequate sources. The economic waste involved in producing and using these questionable dietary supplements must be great.

WILLIAMS, R. J. The Approximate Vitamin Requirements of Human Beings. J.A.M.A. 119, 1:1 (May 2), 1942.

More About Vitamins—If you are one who likes occasionally to take his intellectual nose from the grindstone of severely "practical" information anent his job, then you may enjoy these two entertaining though scholarly papers on what we know, what we don't know, what we hope to know about vitamins.

WILLIAMS, R. R., and WILLIAMS, R. G. Vitamins in the Future. Science 95, 2466:335 (Apr. 3), 1942.

ASSOCIATION NEWS

SEVENTY-FIRST ANNUAL MEETING

ST. LOUIS, MO., OCTOBER 27–30, 1942

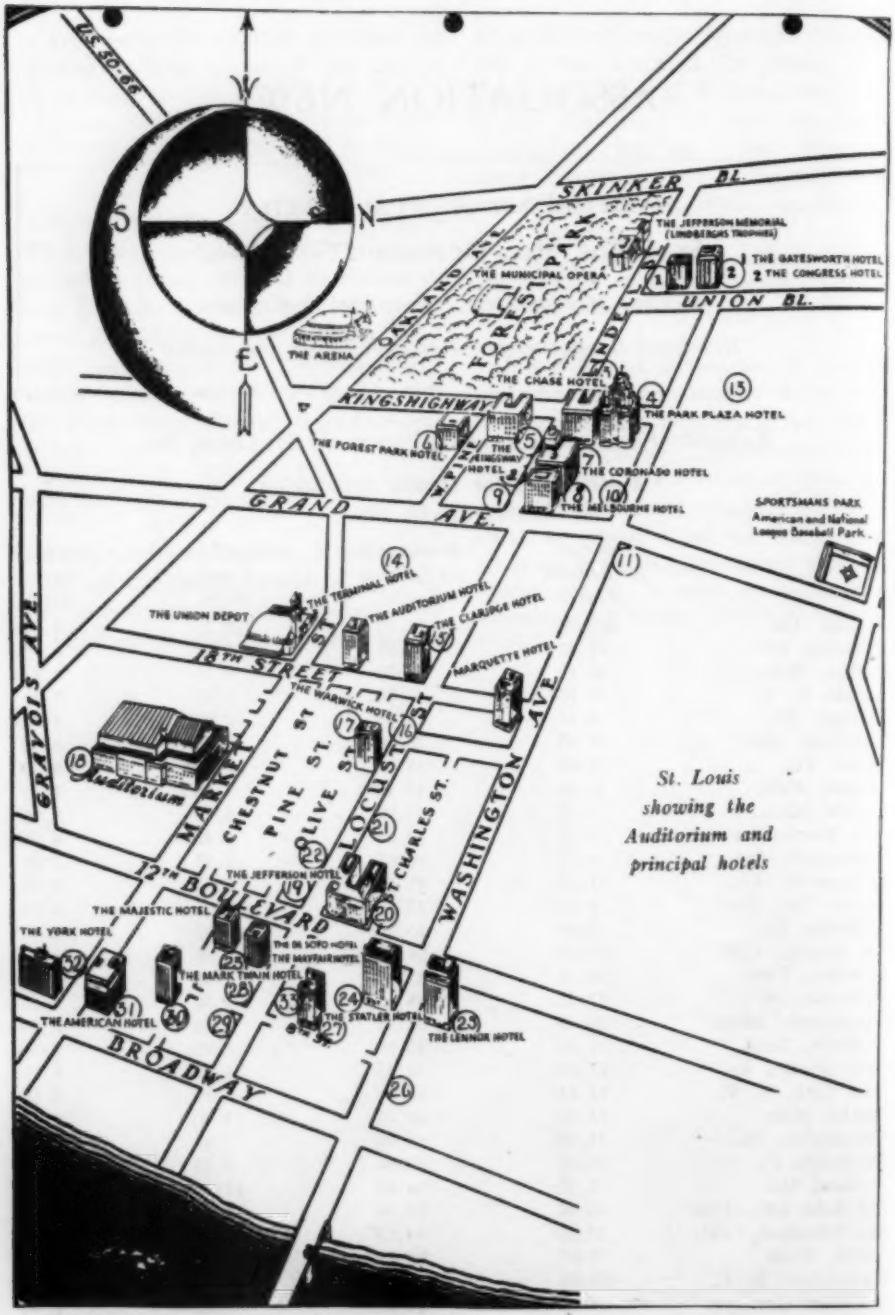
Meeting Headquarters: Municipal Auditorium

Residence Headquarters: Hotels Jefferson and Statler

RAILROAD FARES FROM VARIOUS POINTS TO ST. LOUIS, MO.

American Public Health Association
October 27–30, 1942

From	*One-way for Pullman Travel*	*Round-trip for Pullman Travel*	*One-way Lower Berth*	*One-way Upper Berth*
Atlanta, Ga.	$20.80	$31.20	$5.25	4.00
Baltimore, Md.	29.65	53.55	6.95	4.80
Boston, Mass.	40.10	72.20	9.25	6.40
Buffalo, N. Y.	23.70	43.80	5.80	4.40
Chicago, Ill.	9.65	14.45	2.95	2.20
Cleveland, Ohio	17.60	33.20	4.35	3.30
Dallas, Tex.	22.00	33.05	6.40	4.90
Denver, Colo.	30.05	45.10	7.90	5.95
Duluth, Minn.	23.95	35.95	6.40	4.90
Fort Worth, Tex.	22.45	33.65	6.40	4.90
Indianapolis, Ind.	8.20	16.05	2.95	2.00
Jacksonville, Fla.	31.10	46.65	8.10	6.20
Kansas City, Mo.	9.20	13.80	2.95	2.20
Louisville, Ky.	9.40	14.10	2.95	2.00
Los Angeles, Calif.	67.10	94.15	17.35	13.20
Memphis, Tenn.	10.25	15.40	2.95	2.20
Milwaukee, Wis.	12.45	18.65	3.50	2.65
Minneapolis, Minn.	19.30	28.95	4.35	3.30
Nashville, Tenn.	11.20	16.80	2.95	2.20
New Orleans, La.	25.60	38.45	6.80	5.15
New York, N. Y.	34.85	62.80	8.45	5.80
Omaha, Nebr.	13.85	20.80	3.50	2.65
Philadelphia, Pa.	31.90	57.40	7.85	5.40
Pittsburgh, Pa.	20.40	38.10	4.95	3.45
Portland, Ore.	72.10	94.15	17.35	13.20
Salt Lake City, Utah	46.30	64.70	11.90	9.05
San Francisco, Calif.	67.10	94.15	17.35	13.20
Seattle, Wash.	72.95	94.15	17.35	13.20
Washington, D. C.	29.65	53.55	6.95	4.80
Montreal, Que.	37.55	67.05	9.25	6.40
Halifax, N. S.	65.20	91.60	17.35	13.20
Ottawa, Ont.	34.25	61.60	8.45	5.80
Quebec, P. Q.	43.80	78.20	9.25	6.40
Toronto, Ont.	24.90	44.30	5.80	4.40
Vancouver, B. C.	72.95	94.15	17.35	13.20



St. Louis showing the Auditorium and principal hotels

American Hotel	31	Gatesworth Hotel	1	St. Louis University	9
Bishop Tuttle Memorial	19	Jefferson Hotel	20	Scruggs-Vandervoort-Barney	28
Board of Education	33	Kingsway Hotel	5	Sheldon Memorial	10
Chase Hotel	3	Lennox Hotel	25	Statler Hotel	24
Claridge Hotel	15	Mark Twain Hotel	30	Stix, Baer & Fuller	26
Congress Hotel	2	Mayfair Hotel	27	Third Baptist Church	11
Coronado Hotel	7	Melbourne Hotel	8	Vashon High School (Negro)	14
DeSoto Hotel	23	Municipal Auditorium	18	Warwick Hotel	17
Elks Club	12	Park Plaza Hotel	4	Y.M.C.A.	16
Famous-Barr	29	Public Library	22	York Hotel	32
Forest Park Hotel	6	Roosevelt Hotel	13	Y.W.C.A.	21

RATES QUOTED BY ST. LOUIS HOTELS

Seventy-First Annual Meeting, October 27 to 30, 1942

AMERICAN PUBLIC HEALTH ASSOCIATION

ALL RATES QUOTED ARE FOR ROOMS WITH BATH ON EUROPEAN PLAN

Hotel	*Single*	*Double*	*Suites*
New Hotel Jefferson	$3.00–5.00–6.00–7.00	$6.00–7.00–7.50–8.00	$12.00–20.00
Statler	3.00–3.50–3.75–4.00	5.25–6.00–6.25–6.50	17.00–18.00
	4.25–4.75–5.00	6.75–7.00–9.00	
American	2.00–2.50	3.50–4.00	
Claridge	2.50–3.00	3.50–7.00	
Coronado	2.25 (shower)	4.50–5.00	6.00
	2.75		
DeSoto	2.65–up	4.00–5.00	8.00
Lennox	3.50–4.00–4.50–5.00	4.50–5.00–6.00–7.00	10.50–14.50
	6.00	8.00	
Mark Twain	2.50–4.00	3.50–5.00–5.50	
Maryland	2.25–2.50–2.75	3.25–3.50–3.75–4.00	
		4.50	
(without bath)	1.75–2.00	2.75–3.00	
Mayfair	3.00–3.50–4.00–5.00	4.00–4.50–5.50–6.00	
		7.00	
Melbourne	2.65–3.20–3.70–4.20	4.20–4.80–5.30–5.80	
		6.20	
Park Plaza	4.50	6.00–8.00	12.00–18.00
Warwick	2.00–2.50–3.00	3.00–3.50–4.00–4.50	7.00–10.00
		5.00	

.....**(Cut off on this line and mail to the hotel of your choice)**.....

HOTEL RESERVATION BLANK FOR THE ST. LOUIS MEETING AMERICAN PUBLIC HEALTH ASSOCIATION, OCTOBER 27–30, 1942

To .....
(Name of Hotel)

Please reserve for me ..... rooms for ..... persons for the A.P.H.A. Meeting.

Single room ..... Double room .....

Maximum rate per day for room $..... Minimum rate per day for room $.....

I expect to arrive ..... If date of arrival is changed I will notify you at least 24 hours in advance.

Please acknowledge this reservation.

Name .....

Street Address.....

City..... State.....

The new $7,000,000 Municipal Auditorium, occupying more than a city block. The auditorium will seat up to 11,500 persons.

The Seventy-first Annual Meeting in St. Louis

YOU who have been to St. Louis before won't recognize her face or figure when you rail, bus, motor, or plane into town October 25 or 26 for the annual convention of the American Public Health Association.

For one thing, that old dirty face is gone. The city's smoke elimination program, which has been given nation-wide publicity, has been increasingly effective since its inauguration two years ago. Her citizens are literally breathing freer—and the old lady, herself, is becoming more vain each day as she adopts the use of cosmetics and soap and water—painting and sand-blasting—for a fresh appearance.

St. Louis's old figure also is becoming more streamlined. Do you remember the sprawling river front? The old buildings have been torn down and a beautiful park—the Jefferson National Expansion Memorial—has been planned. Government model housing projects also are under way and some predict that St. Louis, long known as the city of beautiful homes, soon will be known as the "model city."

THE GATEWAY TO THE WEST

The story of St. Louis is one of the most colorful pages in American history. Just 401 years ago, in 1541, the Spanish adventurer, Hernando De Soto, and a handful of goldseekers discovered the Mississippi River. Two hundred and twenty-three years later, in 1764, Pierre Laclede and Auguste Chouteau founded its greatest city—St. Louis.

From fur trading outpost to industrial center—from French and Spanish rule to American Democracy—from 30 hardy pioneers to 1,500,000—through fires and floods, Indian raids and wars, financial panics and depressions, St. Louis has become ever more virile and far sighted. It is one of the nation's most modern cities now. But the colorful landmarks of the sturdy frontier town still stand.

FRONTIER LANDMARKS

Outstanding is the old Courthouse at Broadway and Chestnut Street. It was there that the famous Dred Scott case was tried—a case on the legality of slavery which changed the course of

The Meeting of the Waters, by Carl Milles—on Aloe Plaza across the street from Union Station.

American history. Slaves once were sold at the stone auction block at the east door. It was the starting point of the Daniel Boone trial. It was there that Henry Clay attended court and sold real estate.

Even closer to the river is St. Louis's oldest building—the Old Rock House—a famed rock structure once used as a depot for supplies and furs for traders. Not far from it is the nationally known Old Cathedral on the river front, site of the first Mass in 1764. The origin of St. Louis is epitomized on the portico with three inscriptions—French, Latin, and English. To sweeten the bell's tone, 200 Spanish dollars were cast with other metal. Not far from the heart of the city stands Grant's Log Cabin, occupied by the famous Civil War general when he was a St. Louis resident.

Among other points of interest to the history-minded visitor are the site of the old National Hotel, which once housed Daniel Webster, Abraham Lincoln, and others; the Eugene Field House, where St. Louis's famous poet was born and lived most of his life, and the Dent-Grant House, where General Grant married Julia Dent.

For a living story of what made Missouri great, the visitor has only to see the rare historic collection at Jefferson Memorial, located at the entrance to the grounds of the 1904 Louisiana Purchase Exposition, in Forest Park. Rare books, precious manuscripts, Indian relics, and objects of pioneer days are housed in the Memorial.

Upon these solid foundations of law and freedom, religion and art, trade and industry—typified in these old landmarks—St. Louis was built.

MODERN ST. LOUIS

But what of modern St. Louis? St. Louisans like to boast that one never is at a loss for things to see or do.

If you arrive by train, the first thing that strikes your view is the beautiful

statue by the famed Swedish sculptor, Carl Milles—"The Meeting of the Waters"—directly across from Union Station. The fountain symbolizes the junction of the Mississippi and Missouri Rivers, while the huge railway station, modeled after the gates of Carcassone, is the actual junction of rail lines, 19 of them from all sections of the country.

Going to your hotel, which is but a short ride from the station, you cannot help noticing the beautiful downtown buildings—the magnificent new Civil Courts Building, the United States Customs and Courthouse, the old City Hall and Municipal Courts Building.

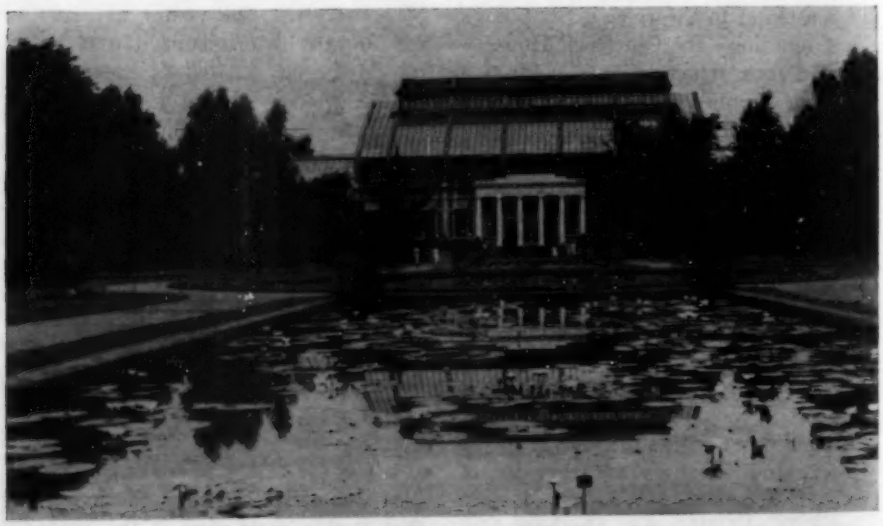
"OLE MAN RIVER"

Perhaps you'd like to see a little more of the city before your convention opens? Of course, you'll want to go down to the old river front to watch the tugs slowly pushing barges loaded with vital war materials down the river. Now and then, a colorful, old river packet of the type described by Mark Twain moves slowly upstream, in sharp contrast to the sleek coast guard cutters and small motor launches. Near impressive Eads Bridge, the world's first steel-truss bridge, built in 1874 at a cost of nearly $10,000,000, you'll see the world's largest inland excursion boat—the million dollar, streamlined, and air-conditioned S. S. Admiral.

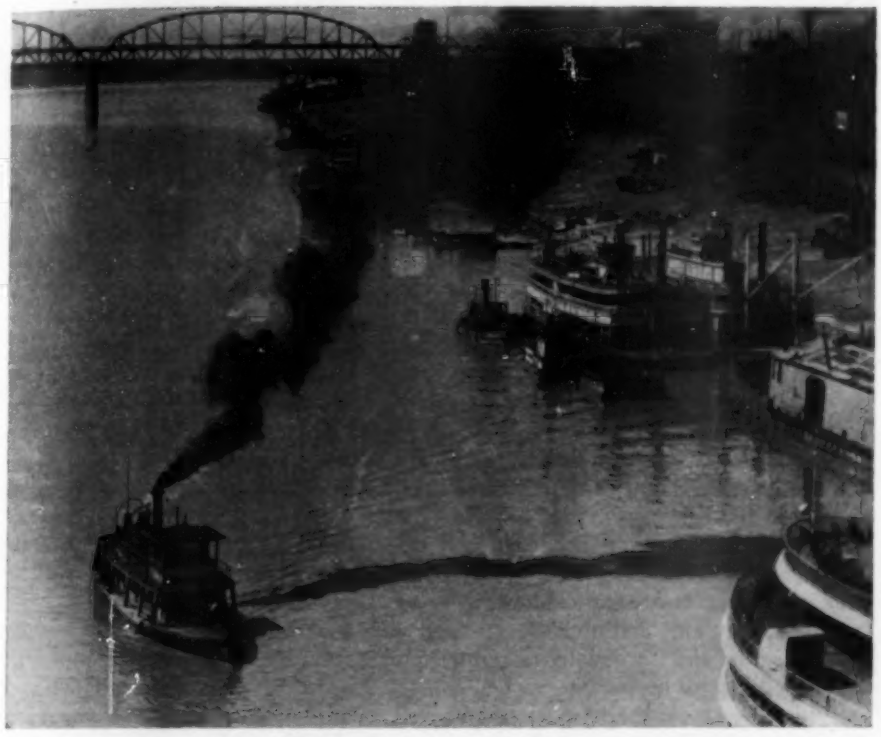
Perhaps you'll have time for the short ride to one of the country's largest parks. Out at Forest Park, there is something for every taste. Do you like sports? In the park, as in other spots throughout the city, are facilities for golf, baseball, fly-casting, tennis, picnicking.

CIRCUS DAY

Do you get a kick out of a circus? Well, St. Louis has one every day at the Zoo, reputed to be one of the most complete exhibits of animal life in the world. And no trip to St. Louis is complete without a jaunt or two to Forest Park to watch the chimpanzees, elephants, and cats strut their stuff in twice or three times daily shows. Two rare pandas, Happy and Pao Pei, tumble around constantly for the visitors' amusement.



Flowers bloom all year in St. Louis. Here is a scene at the famous Shaw's Garden.



"Ole Man River—she just keeps rollin' along." Visitors to St. Louis are especially anxious to see the Mississippi, the world's most colorful waterway.

Each year, millions of visitors watch Jimmy, the trained chimp, and his "gang" turn backward somersaults, ride bikes, smoke cigarettes, play in an orchestra, and put trained ponies and dogs through their paces. Others like to watch the feeding of barking sea lions, the clumsy wanderings of the bears, or the awe-inspiring force-feeding of the giant boa-constrictor.

The zoo is huge. It covers more than 77 acres and houses thousands of mammals, birds, fish, and reptiles. Its most outstanding feature is its unusual back-to-nature barless "cages." Every effort has been made to simulate the natural surroundings of the particular animals' habitats.

Are you interested in art?. The St. Louis Art Museum officials have demonstrated that one does not have to be in the lorgnette class to enjoy fine painting and sculpture. The policy of appealing to the great class of people who have had no special training in art was foremost in the minds of the museum's founders—and a policy which has been followed throughout its history since it was originated in free evening drawing classes sponsored in 1874 by Washington University to the present day.

The museum is housed in a huge million dollar building of Bedford stone on "Art Hill," in the central western section of Forest Park. An impressive statue of bronze—"St. Louis, the Crusader"—stands before the building. Among the most interesting exhibits at the museum are the period rooms, which include medieval displays, a Gothic

Court, early French rooms, a Hispano-Moorish Court, and five American and five European period rooms. There are excellent collections of Oriental rugs and Chinese ceramics.

FLOWERS IN OCTOBER

Do you like puttering around in the garden? Then, don't miss seeing the floral exhibits at the Jewel Box in the park. The St. Louis Park Department offers a changing display of plants from 500,000 floral specimens grown in the park greenhouse. The Jewel Box is uniquely designed in the modern manner in steel and glass. Incidentally, you also will want to see the Missouri Botanical Garden, better known as Shaw's Garden, down in South St. Louis. It is rated with the Kew Gardens of London as the greatest in the world from the standpoint of completeness of collections. Its 75 acres are especially noted for rare lily hybrids and orchids.

Yes . . . and there are many more interesting things to be seen in St. Louis, too—just ask any of the friendly people you run into on the street. St. Louisans brag that their amusement spots—night clubs, theaters, stage plays—can't be beat. But, they are even more proud of their churches, schools, hospitals, and homes. They like sports teams and their symphony. . . .

ALL-AMERICAN CITY

The St. Louisan is an all-American. For to St. Louis have come residents of every other section of the country. He has the strength of the North, the friendliness of the South, the experience, knowledge, and tradition of the East, the far-sightedness of the West.

Make arrangements now to attend our annual convention in St. Louis, October 26 to 30. Clear your desk; jot it down on your memo pad. For one of the most helpful and interesting conventions in the history of the American Public Health Association, we'll see you in St. Louis!

This is the physical setting for the Association's 71st Annual Meeting. In the August JOURNAL we shall tell you what St. Louis has to show you as a public health worker.

CLOSING DATE FOR SUBMITTING FELLOWSHIP APPLICATIONS

MEMBERS who may be interested in applying for Fellowship in the A.P.H.A. are hereby advised that Fellowship applications should be received not later than August 1, to insure consideration at the 71st Annual Meeting.

WANTED: The following issues of the *American Journal of Public Health*—July and August, 1941; and January, 1942. The Association will be glad to pay postage.

APPLICANTS FOR MEMBERSHIP

The following individuals have applied for membership in the Association. They have requested affiliation with the sections indicated.

Health Officers Section

Franklin V. Boyd, M.D., St. Landry Parish Health Unit, Opelousas, La., Director

Edward W. Colby, M.D., 173 Water St., Exeter, N. H., Health Officer, Eastern Health Dist., State Board of Health

James M. Coram, M.D., Health Dept., Beckley, W. Va., Raleigh County Health Officer

Thomas D. Fitzgerald, M.D., M.S.P.H., University Health Service, Ann Arbor, Mich., Physician

Richard P. Good, M.D., 308 Armstrong Landon Bldg., Kokomo, Ind., Vice-President, City Board of Health

Thomas L. Harvey, M.D., 805 Lincoln Ave., Newport, Tenn., Director, District Health Dept.

Eugene L. Kidd, M.D., Chehalis, Wash., Lewis County, Health Officer

Helen P. Lanting, M.D., M.S.P.H., Gladwin, Mich., Director, Tri-County Health Dept.

Clarence R. Lindgren, M.D., Lane County Court House, Eugene, Ore., Lane Co. Health Officer

Alexander S. Mack, M.D., 320 Locust St., Oak Harbor, Ohio, Ottawa County Health Commissioner

Charles W. Reid, M.D., Madison-Tensas Bi-Parish Health Unit, Tallulah, La., Director

Reuben F. Reider, M.D., D.P.H., 307 S. Wright St., Champaign, Ill., Director, Champaign-Urbana Public Health Dist.

Oscar Rogol, M.D., C.M., 135 Main St., Seymour, Conn., Health Officer, Town of Oxford

William T. Veal, M.D., 99 Water St., Stonington, Conn., Health Officer

Michael A. Viggiano, M.D., New Martinsville, W. Va., Wetzel County Health Officer

J. Margaret Warner, City Hall, Burlington, N. J., Sanitary Inspector, City Board of Health

Winfield E. Wight, M.D., 24 Goodwin Court, Thomaston, Conn., Health Officer

Angelo M. Williams, M.D., M.P.H., 56 Highland St., Burgettstown, Pa., Dist. Medical Director, State Dept. of Health

Laboratory Section

James H. Baker, M.A., 110 W. 18th St., New York, N. Y., Chemist, Gar-Baker Laboratories, Inc.

Ernest H. Blaustein, A.B., 36 Quincy St., Roxbury, Mass., Student, Massachusetts Institute of Technology

Hernando Groot, M.D., 55 Shattuck St., Boston, Mass., Student, Harvard School of Public Health

Roberto Nevarez, M.D., 59 Hancock St., Boston, Mass., Student, Harvard School of Public Health

Ross A. Snider, M.S., E. Third & Kilgour Sts., Cincinnati, Ohio, Asst. Chemist, U. S. Public Health Service

Gustave B. Ulvin, Ph.D., 130 W. Garfield Blvd., Chicago, Ill., Chief Chemist and Bacteriologist, Sidney Wanzer & Sons

Bernard Witlin, Sc.D., P. O. Box 3378, Honolulu, T. H., Bacteriologist, Territorial Board of Health

Engineering Section

Norman G. Ambrosini, B.S., 105 South F. St., Aberdeen, Wash., County Sanitarian, Grays Harbor Public Health Dept.

Ernest C. Anderson, M.S., Wichita Health Unit, Wichita Falls, Tex., Asst. Public Health Engineer, U. S. Public Health Service

Holbrook A. Bourne, M.P.H., 550 Main St., Hartford, Conn., Acting Director, Bureau of Food and Sanitation, City Board of Health

Edward B. Carroll, A.B., 709 Ridgeway Ave., Morgantown, W. Va., Senior Sanitarian, Public Health Training Center

Lieut. Henry M. Chick, Station Hospital, Fort Jackson, S. C., Sanitary Corps, U. S. Army

Ralph S. Lake, 427 E. State St., Rockford, Ill., Chief Plumbing Inspector, City of Rockford

Lieut. Irvin M. Lefton, M.S.P.H., 4028 North 16th St., Milwaukee, Wis., Student (Army Sanitation), Carlisle Barracks, Pa.

Edmund G. Wagner, B.S., Univ. Campus, State Dept. of Health, Minneapolis, Minn., Public Health Engineer, Div. of Sanitation

John B. Wallace, B.S., P. O. Box 204, New Martinsville, W. Va., Sanitarian, Wetzel County Health Dept.

Harry W. Weeks, 637 W. Edwards St., Springfield, Ill., Asst. State Director, Com-

munity Sanitation, State Dept. of Public Health

Industrial Hygiene Section

Knowlton J. Caplan, M.S., St. Louis County Health Dept., Clayton, Mo., Industrial Hygiene Engineer

David M. Gould, M.D., 8302 16th St., Silver Spring, Md., Asst. Surgeon (R), U. S. Public Health Service

Clarence Kooiker, M.D., U. S. Public Health Service, Washington, D. C., Asst. Surgeon (R), States Relations Div.

Cedric Northrop, M.D., 1412 Smith Tower, Seattle, Wash., Tuberculosis Control Officer, State Health Dept.

Food and Nutrition Section

Helen P. Hostetter, M.S., 620 Mills Bldg., Washington, D. C., Editor, *Journal of Home Economics*, American Home Economics Assn.

Louise S. Moody, B.S., LaMoille, Ill., Nutritionist, State Dept. of Health

Leone Pazourek, M.S., 212 W. Monroe St., Springfield, Ill., Nutrition Consultant, State Dept. of Public Health

Benjamin P. Sandler, M.D., 1224 Walton Ave., Bronx, N. Y., Physician, Navy Yard Dispensary

Maternal and Child Health Section

Leonard Parente, M.D., M.P.H., 126 Church St., Hamden, Conn., Student, Yale Univ.

Public Health Nursing Section

Helen Brazonis, 308 W. Walnut St., Carbondale, Ill., Public Health Nurse, State Dept. of Public Health

Martha Buric, Logan County Health Dept., Logan, W. Va., Public Health Nurse

L. Dorothy Carroll, B.S., 305 Euclid Ave., Morgantown, W. Va., Asst. Public Health Nursing Consultant, U. S. Public Health Service

Helen M. Culp, R.N., Box 791, Lawton, Okla., Public Health Nurse, U. S. Public Health Service

Bernadine M. Dougherty, R.N., 149 North St., New Martinsville, W. Va., Clinical Nurse, Wetzel County Health Dept.

Bertie J. Ferrell, Logan County Health Dept., Logan, W. Va., Public Health Nurse

Genevieve E. Finnen, P. O. Box 104, Newport, Ky., Public Health Nurse, U. S. Public Health Service

Virginia V. Hand, 2213 Marshall Ave., Elm Grove, Wheeling Station, W. Va., County Health Nurse, City-County Health Dept.

Isabelle R. MacCann, 1512 Virginia St., Charleston, W. Va., Dist. Nursing Supervisor, State Dept. of Health

Helen M. Marcy, R.N., A.B., Box 1263, Lakeview, Ore., Lake County Public Health Nurse

Marguerite A. Maxwell, 205 Maple St., New Martinsville, W. Va., Maternity and Delivery Service Trainee, State Health Dept.

Mary H. Reese, R.N., P. O. Box 974, Las Cruces, New Mexico, County Nurse, Dona Ana County Health Dept.

M. Virginia Welch, 222 E. Oak St., Arcadia, Fla., Public Health Nurse

Public Health Education Section

Mary K. Ferguson, R.N., 551 Lytton Ave., Palo Alto, Calif., Health Nurse, Stanford Univ.

Donald B. McMullen, Sc.D., 801 E. 13th St., Oklahoma City, Okla., Assoc. Professor, Dept. of Hygiene and Public Health, Univ. of Oklahoma School of Medicine

Dr. Manuel Gonzales-Rivera, Av. El Euzkara 85, Colonia Industrial, Mexico City, Mexico, Supervisor General, Dept. de Salubridad Publica

Adele P. Schlosser, B.A., 839 Howard Ave., New Haven, Conn., Student, Yale School of Public Health

Rachel E. Spinney, M.S.P.H., 65 Wethersfield Ave., Hartford, Conn., Health Education Secretary, Hartford Tuberculosis and Public Health Society

Epidemiology Section

Martin D. Baum, D.V.M., 116 Temple St., Los Angeles, Calif., City Veterinarian and Director of Milk and Meat Inspection, City Health Dept.

Lt. Commdr. James E. Fetherston, M.C., U. S. N., U. S. S. Seattle, Navy Yard, Brooklyn, N. Y.

John B. Gerberich, M.A., 2350 Fourth St., Cuyahoga Falls, Ohio, Laboratory Asst. in Bacteriology, Kent State Univ.

John S. Kitching, M.D., D.P.H., 453 W. 12th Ave., Vancouver, B. C., Canada, Epidemiologist and Asst. Senior Medical Health Officer, Metropolitan Health Committee

Unaffiliated

Amos H. Englebeck, 1904 First Central Tower, Akron, Ohio, President, Summit County Board of Health

EMPLOYMENT SERVICE

The Association Employment Service seeks to bring to the attention of appointing officers the names of qualified public health personnel and to act as a clearinghouse on employment. This is a service of the Association conducted without expense to the employer or employee.

From the registry of persons available, selected announcements are published from time to time. Appointing officers may obtain lists of all registrants on request.

Address all correspondence to the Employment Service, American Public Health Association, 1790 Broadway, New York, N. Y.

U. S. CIVIL SERVICE COMMISSION

The Commission has announced unassembled examinations for Junior Public Health Nurse at $1,800 a year and Junior Graduate Nurses at $1,620 a year, under which the training and age requirements of announcements No. 88 and 103 of 1941 have been amended. Persons interested should communicate with the U. S. Civil Service Commission in Washington or obtain the amended announcements at any first or second class post office.

Physicians Needed in Canal Zone

The U. S. Civil Service Commission announces an examination to secure physicians for clinical service in the Panama Canal Zone. Graduation from a class A medical school subsequent to May 1, 1920, is required, and the applicant must be under 50, 25 to 35 years of age preferred. Entrance salary $4,000. Persons interested should communicate with the U. S. Civil Service Commission, Washington.

Positions Available

Physician with either public health training or experience in local health department administration to serve as health director in a county health department in mid-western state. Salary $4,000 and $500 travel (flat rate). Well established department with offices in attractive little city of 10,000. Write **Box T,** Employment Service, A.P.H.A.

Wanted: Trained Public Health Nurse, starting salary $1,500 per year and traveling expense, increase to $1,620 within 6 months. Saginaw County Health Dept., Saginaw, Mich.

Western state department of health will consider applications from physicians to fill four existing vacancies among county health officers, one vacancy in venereal disease control and positions as laboratory technicians. Write **Box S,** Employment Service, A.P.H.A.

County Public Health Nurses for New Mexico. Must have four months' postgraduate instruction under one of the recognized public health nursing courses and one year's experience. Must drive and have a car. Address inquiry to State Health Department, Santa Fe, N. M.

Public Health Engineer

Responsible professional public health engineering involving field investigations and office studies in the application of sanitary measures. The more difficult engineering and sanitation field surveys include supervision over public water supplies, sewerage systems and sewage treatment plants and review of plans for same, and promotion and supervision of sanitation programs. Minimum qualifications: Training and experience equivalent to 3 years' civil engineering experience, including 2 years in public health or sanitary engineering; *or* completion of an academic year of graduate study and a year's experience in sanitary or public health engineering; *and* graduation from a college of recognized standing with a major course in civil or sanitary engineering. The salary range is $205 to $250 per month depending upon experience. Apply **Box E,** Employment Service, A.P.H.A.

Other Vacancies

Southwestern state health department seeks 2 physicians for assignment to district health units, personally to conduct several small venereal disease clinics on a rotating schedule. Experience preferred but not required. Salary $3,000, plus actual travel allowance not to exceed $1,200. Write **Box V,** Employment Service, A.P.H.A.

The New Mexico State Department of Public Health will consider applications for the position of Assistant Director of the Maternal and Child Health

Division. Address inquiries to the State Department of Public Health, Santa Fe, N. M.

Wanted: Trained Public Health Nurse, starting salary $1,500 per year and traveling expenses. Increase may be expected within 6 months. Shiawassee County Health Department, Corunna, Mich.

Sanitarian Wanted: Starting salary $1,800 per year with travel allowance of $50 per month. Man must have his own car. Bachelor's degree followed by at least one year's course or its equivalent in subjects necessary for one entering the public health field, or an engineering degree plus one year's experience in sanitary or public health engineering required. A course in public health training may be considered as an equivalent for a part of the experience requirement. Apply Director District Department of Health No. 6, Central Office, Newberry, Mich.

Wanted: Nurse for county health work. Salary $1,800 per year with travel allowance (additional) of $500 per year. Address District Health Department 2, West Branch, Mich.

Instructor in Bacteriology, Medical School, large midwestern university, M.D. (or Ph.D. or D.Sc. in Bacteriology); Male. Salary $1,800 to $2,500 according to age and experience. Write **Box D,** Employment Service, A.P.H.A.

POSITIONS WANTED

ADMINISTRATIVE

Teaching or administrative position desired by physician, aged 48. Experienced teacher in preventive medicine and public health, now employed at prominent medical school; 20 years' experience in municipal health administration and epidemiology. **A-491**

Physician, B.S., M.D., and M.S.P.H., University of Michigan, aged 35, experienced city-county health administration and as director university student health service. Will consider permanent responsible position offering good income. **A-492**

Physician with 25 years full-time experience in public health administration is available for immediate appointment. Moderately hard of hearing; otherwise fully able. Salary $4,500 or better. **A-497**

WOMEN PHYSICIANS TRAINED IN PUBLIC HEALTH

Woman aged 34, M.D., University of Basle, Switzerland, M.S.P.H. DeLamar Institute, Columbia University. U. S. citizen. Excellent references. Especially interested in industrial hygiene. **A-493**

Woman aged 41, M.D. Columbia University, M.S.P.H. DeLamar Institute, experienced in epidemiology and research, seeks position offering administrative experience. **A-494**

Woman physician, aged 48, M.D., University of Vienna. Excellent European pediatric experience. Seeks position in pediatrics, administration or statistical research. **A-495**

HEALTH EDUCATION

Health Educator, Negro, man with background of High School administration and M.S.P.H. from University of Michigan, seeks position in Health Education. Public agency or educational field. Excellent references. **H-497**

Health Educator, M.A. in Education, 10 years' background in community organization for public health education, also teaching of personal and community health at high school and college levels. Public health nurse, able to teach mental and social hygiene as well as general health education. East preferred. **H-498**

Teacher and research worker, man, Ph.D., age 52. Extensive record as college professor of biology and hygiene and investigator, for the past two years engaged in research. **H-499**

Health Educator. Man with M.S. in preventive medicine and public health. Negro. Seeks position in Health Education or field work with official or nonofficial agency. **H-500**

Woman with master's degree in health education, 12 years' successful experience in public school and college teaching, administration and research. Will consider position in normal school, public schools, or in official or nonofficial health agencies. Prefers South or East. Available at once. **H-501**

LABORATORY

Milk Sanitarian and Technologist, age 37, Ph.D., Bacteriology, Wisconsin, 10

years' experience in milk and food sanitation from industrial and official angle, seeks administrative position with opportunity for research or investigational work preferred. **L–381**

Chemist, Sc.D., Biochemistry, Johns Hopkins University. Age 31. Public health laboratory experience, teaching experience. Desires position with promise of advancement, preferably in commercial organization. **L–461**

Bacteriologist, young man 28, with B.S. in industrial science, experienced in newspaper work, salesmanship and now employed in state department of health laboratory, seeks position as bacteriologist or doing promotional work of public health nature. **L–465**

MISCELLANEOUS

Well trained opthalmologist desires position in public health work. **M–450**

Veterinary Doctor, M.P.H., University of Pennsylvania, age 27, with two years of practice, seeks position in food, meat, milk, or livestock sanitation with state or local health department. Also interested in teaching position with research facilities. **M–451**

Public Health Nurse with M.A. degree wishes position in health supervision and teaching in college or public school. West preferred. **M–452**

Administrative Assistant or Health Educator, woman, M.A. 10 years' experience in health agency offices; 7 years' teaching experience; writer on health and other subjects; experienced in independent research; some training in social work; some hospital experience. **M–453**

NEWS FROM THE FIELD

THE NUTRITION FOUNDATION AWARDS GRANTS

THE Nutrition Foundation announces that grants for $125,000 have been awarded for fundamental research in the science of nutrition.

Dr. Karl T. Compton, Chairman of the Board of Trustees of the Foundation, who is also President of Massachusetts Institute of Technology, said that in making these independent research studies possible for the public welfare, the members of the food and related manufacturers, acting together through the Foundation, were opening a new frontier of public service.

George A. Sloan, President of the Foundation, announced the election of the National Dairy Products Corporation as a founder member, and the election of their President, L. A. Van Bomel, a member of the Board of Trustees. Dr. Lloyd K. Riggs of National Dairy Products, and Dr. J. T. Knowles, in charge of the Chicago Laboratory of Libby, McNeill & Libby, were appointed members of the Food Industries Advisory Committee.

Dr. Compton said the Board had considered a large group of applications with reference to three primary objectives, which the Board wishes particularly to support under present conditions:

First: Their contribution to our war effort;

Second: Their immediate avdantage to public health;

Third: Their long time advancement of the fundamental science of nutrition—the kind of exploratory research that will lay the foundation for better health and scientific guidance in the food industry of tomorrow.

To date, 22 universities have received grants.

Grants were also made to the Children's Fund of Michigan, Detroit, Mich., the Food and Nutrition Board of the National Research Council, Washington, D. C., and to the New York State Agricultural Experiment Station, Geneva, N. Y.

UNIVERSITY OF MINNESOTA ENGINEERING COURSE

AN intensive course in public health engineering will be offered at the University of Minnesota under the auspices of the Department of Preventive Medicine and Public Health. This course, which will run from June 15 to August 28, 1942, will bring together in an 11 weeks' term several of the fundamental courses in the regular public health engineering curriculum leading to a master's degree. All courses will be of usual academic quality, and credit so earned will count toward a degree. The courses will consist of lectures, conferences, laboratory exercises, and field demonstrations. The facilities of the Division of Sanitation in the Minnesota Department of Health, as well as of local health departments, will be utilized for student teaching.

Registrations will be limited to graduates in engineering or persons who have had suitable experience in the field of environmental sanitation. All inquiries should be directed to the Department of Preventive Medicine and Public Health, University of Minnesota, Minneapolis, Minn.

MALARIA IN NICARAGUA

PRESS reports in May indicated that Dr. Luis M. DeBayle, the chief medical officer of the Nicaraguan Army and Director of Public Health, has instituted a campaign against malaria as the number of deaths has increased 30 per cent in the past year. Dr. DeBayle was a guest of the American Public Health Association at the 70th Annual Meeting in Atlantic City.

PUBLIC HEALTH ASSOCIATION OF NEW YORK CITY

THE Public Health Association of New York City held its Sixth Annual Meeting at Hotel George Washington in the Borough of Manhattan on May 13.

The proceedings opened with a panel discussion in the afternoon the theme of which was "Public Health, Social and Legal Problems Connected with Prostitution." Participants in the discussion were the following: Ruth Collins, Superintendent, House of Detention for Women; Dr. Roger E. Heering, Passed Assistant Surgeon, U. S. Public Health Service; Patrick J. Shelly, Chief Officer, Probation Bureau, Magistrates' Courts; Honorable Jeanette G. Brill, former City Magistrate; and Dr. Thomas A. Storey of the American Social Hygiene Association. The moderator of the panel was Dr. Jacob A. Goldberg, Executive Secretary, Social Hygiene Committee of the New York Tuberculosis and Health Association. The audience participated in the discussion.

The following officers were elected to serve until the Annual Meeting in 1943:

President—Helen C. Manzer, Ph.D.
First Vice-President—George T. Palmer, Dr.P.H.
Second Vice-President—Alfred E. Shipley, M.D.
Secretary-Treasurer—Frank Kiernan

New members of the Executive Board were elected as follows:

Arthur I. Blau, M.D.
James M. Dunning, M.D.
J. Leon Lascoff, M.D.
Pauline Murrah
John L. Rice, M.D.
James A. Tobey, Dr.P.H.

Sol Pincus, Deputy Commissioner of Health of the City of New York, was elected as representative to the Governing Council of the American Public Health Association. The Secretary reported that the membership numbered 282.

TRAVELING EXHIBIT—FOOD FOR HEALTH

BRUNO GEBHARD, M.D., Director of the Cleveland Health Museum, has announced that the following exhibits are available for loan purposes, and the Museum will also make duplicates for any organization or institution wishing to purchase them. Prices for duplicates will be quoted on request.

Protective Foods (Eat Every Day)—No. 101
How Many Calories? (Caloric Value of Favorite Foods)—No. 102
What Do We Need for Work and Play?—No. 103
Why We Eat—No. 105
Food Building Blocks—No. 106
A Nickel's Worth—No. 109
Foods, Facts, and Fallacies (Food Lie Detector)—No. 110
Double Your Food Value for the Same Price—No. 111
The Normal Diet Must Stand 4 Square—No. 115

Since the Museum has no endowment for such loan exhibits, a rental charge of $5.00 per single unit per week, including time for transportation, must be made.

Units No. 103 (What Do We Need for Work and Play) and No. 105 (Why We Eat) are considered as *double* units, but separate sections may be borrowed as single units.

All exhibits are sent express collect and must be returned prepaid.

Special arrangements can be made for longer periods of time, and for the use of more than one unit.

SAVANNAH DEDICATES NEW MUNICIPAL HEALTH CENTER

A NEW Municipal Health Center Building was dedicated in Savannah, Ga., on March 25. The three story building, recently completed as a joint city-WPA project, at a cost of $100,000, houses all of the official and nonofficial health agencies incorporated into the organization known as the Savannah Health Center, directed by the City and

County Health Department, of which Charles C. Hedges, M.D., is director. Those participating included Mayor Gamble of Savannah, who reviewed progress made in the field of health services in the city since the appointment of the first health officer in 1790; Allen H. Bunce, M.D., President, Medical Association of Georgia; Monroe J. Epting, M.D., past President of the Savannah Health Center; and A. J. Waring, M.D., President of the Savannah Health Center. The principal address, "The Health Center and the Health Officer," was delivered by Dr. Harry Stoll Mustard, Director of the DeLamar Institute of Public Health, Columbia University, New York, N. Y.

AWARD OF THE CHANDLER MEDAL OF COLUMBIA UNIVERSITY

FOR outstanding achievements in chemical science Dr. Robert R. Williams of the Bell Telephone Laboratories, New York, N. Y., and his brother, Dr. Roger J. Williams, of the University of Texas, received recently awards of the Charles Frederick Chandler Medal of Columbia University. This medal was established in 1910 in honor of the chemistry professor of Columbia whose name it bears who was one of the founders of the American Public Health Association.

The award to Dr. Robert R. Williams was for his years of work on the isolation of vitamin B_1 and his contributions to the elucidation of its chemical structure. The award to Professor Roger J. Williams was made in recognition of his discovery of pantothenic acid, a powerful regulator of growth, and for his contributions to the knowledge of the vitamin B complex.

TALKS TO THE PUBLIC ON GONORRHEA

MANY physicians will be called upon to give information before groups on gonorrhea. The emphasis placed on eradication of this disease by official agencies such as the U. S. Public Health Service, and the New York City Health Department will cause lay groups to schedule lectures. Of course, the physicians known to the officers and members will be invited. What to say? Some hints as to the approach to the public health aspects of gonorrhea as a problem for the individual and for the community were given in recent radio talks over WYNC by Herman Goodman, M.D., under the auspices of the Bureau of Health Education and the Bureau of Social Hygiene of the New York City Health Department. Copies of these talks may be obtained by writing to Director, Bureau of Health Education, 125 Worth Street, New York, N. Y., or to Station WNYC. There is no charge.

CHARLESTON COUNTY HEALTH OFFICER

THE Legislature of South Carolina recently enacted a law requiring that the Health Officer of Charleston County be elected with the other county officers instead of being appointed by the County Board of Health. The Medical Society of South Carolina has adopted a resolution expressing "unqualified condemnation" of the requirement.

CENSUS DATA ON SEWERAGE SYSTEMS

THE *Summary of Census Data on Sewerage Systems* appearing in *Public Health Reports*, Volume 57, No. 12, March 20, 1942, pp. 409–421, is available for general publication, though at present reprints are not available.

The material from which the summary was prepared is also available in mimeographed form arranged by states and lists basic data on sewerage systems including detailed information on the rated capacity and methods of treatment of each individual plant and also on the population served (1940), date of installation, volume of sewage treated, populations contributing untreated sewage discharged by individual communi-

ties, and the bodies of water into which both treated and untreated sewage is discharged. A similar census of water treatment plants is now in preparation and will be available in the near future. —From Stream Pollution Investigations, U. S. Public Health Service, East Third and Kilgour Streets, Cincinnati, Ohio

ON MILITARY LEAVE FROM THE ILLINOIS DEPARTMENT OF PUBLIC HEALTH

ON military leave from the Illinois Department of Public Health are Richard Baxter, Vivian Clarke, R.N., Arnold M. Cohn, M.D., Theodore Cohn, Benedict Corsiglia, Cecil Curtwright, William Dietch, Harold S. Duhamel, Leonard Dworsky, George L. Farnsworth, Harry S. Fein, M.D., M. R. Golly, William A. Hasfurther, William Honsa, Robert E. Hunt, M.D., Paul M. Kiel, Raymond I. Leland, Robert Lynskey, Harold McCormick, C. H. Miller, M.D., Douglas B. Morton, R. S. Nelle, C. L. Nelson, Daniel O'Connell, E. J. Olenick, M.D., Thomas E. Philbin, Carl W. Reh, Walter H. Rieger, Reno Rosi, M.D., Jack G. Sieg, J. F. Shronts, M.D., H. J. Spaeder, and Loren Woodman.

NEW YORK STATE DEPARTMENT OF HEALTH PERSONNEL CALLED FOR MILITARY DUTY

MEMBERS of the Medical and Sanitary Engineering staffs of the New York State Department of Health who have recently been called for military duty are listed below, together with the date of commencement of such duty. These are in addition to those whose names were listed in the May JOURNAL.

John E. Kiker, Jr., Assistant Sanitary Engineer, May 13, 1942
Charles Lose, Junior Sanitary Engineer, April 15, 1942
Joseph Salvato, Junior Sanitary Engineer, April 15, 1942
William Smith, M.D., Assistant District Health Officer, May 15, 1942

PUBLIC HEALTH SERVICE LOANS PERSONNEL TO NEW YORK STATE

THE New York State Department of Health announces that three additional physicians and one sanitary engineer have been loaned to the department by the U. S. Public Health Service.

Physicians

Morris J. Stone, M.D., assigned to the Division of Syphilis Control
Abe L. Scheff, M.D., assigned to the New York office of the Health Preparedness Commission
George Alpert, M.D., assigned to the Gouverneur district office

Sanitary Engineer

Arthur Wallach, assigned to the Syracuse branch office.

WEST VIRGINIA PUBLIC HEALTH ASSOCIATION

AT its recent Annual Meeting, the West Virginia Public Health Association elected the following officers to serve for the next year:

President—Norman G. Angstadt, M.D., Fayetteville
1st Vice-President—Alice Duff, Morgantown
2nd Vice-President—O. R. Lyons, Beckley
Secretary-Treasurer — Dorothea Campbell, Charleston

HOWARD TAYLOR RICKETTS PRIZE

THE Howard Taylor Ricketts Prize of the Division of the Biological Sciences of the University of Chicago, according to *Science*, has been awarded to Dr. Jose Oliver-Gonzalez, a Puerto Rican by birth, Research Associate at the university, in recognition of his work indicating that trichinosis is caused by two forms of parasite and therefore immunity to the disease can be produced only by the formation of two antibodies. The prize was established in 1913 in honor of Dr. Howard Taylor Ricketts of the University of Chicago, who discovered the cause of Rocky Mountain spotted fever. He died in 1910.

THE KELLOGG FOUNDATION'S CONTRIBUTION TO PUBLIC HEALTH IN THE EMERGENCY

THE Kellogg Foundation has announced a plan whereby it will assist students of limited means in public health, medical, dental, and nursing schools to continue their studies during the emergency. The accelerated programs of study in many schools have brought new responsibilities to students who have heretofore depended on vacation and other earnings to help defray the cost of their studies.

Discussions held at a recent meeting of the Association of Schools of Public Health and individual conferences with deans have made it clear that the need exists both for scholarships and for loan funds for students of public health and others.

The Foundation has offered to nearly one hundred and fifty schools of public health, dentistry, medicine, and nursing in this country and Canada the sum of $10,000 a year in the nature of a gift to each school that wishes to accept it. The funds granted will not be returned. If loan funds are set up by the schools, payments will be made to the school, thus providing a continuing or revolving fund.

The matter of scholarships will be left entirely in the hands of the school. The Foundation will have nothing to do with the selection or approval of the candidates but expects that scholarships will be granted on the basis of scholastic ability, character, and need in comparison with other applicants. It is the hope of the Kellogg Foundation that money so used will be chiefly for the purpose of encouraging exceptional students otherwise unable to enter the field of public health. The only restriction specified is that the scholarships for public health students shall not amount to more than $800 to any one student in one year.

The Kellogg Foundation is to be commended for this splendid contribution to public health and related sciences in the war effort. The public health profession can indeed be gratified with this sympathetic understanding of its urgent needs.

THIRTEENTH ANNUAL MEETING OF THE WESTERN BRANCH, A.P.H.A.

THE 13th Annual Meeting of the Western Branch was held in Seattle, Wash., May 26–29.

The following officers were elected for 1942–1943:

President—Donald G. Evans, M.D., Seattle, Wash.
President-elect—Karl F. Meyer, M.D., San Francisco, Calif.
Secretary—W. Ford Higby, San Francisco, Calif.
Treasurer—Guy S. Millberry, San Francisco, Calif.

MISSOURI PUBLIC HEALTH ASSOCIATION

ON May 7 to 9 the Missouri Public Health Association held its Eighteenth Annual Meeting in Kansas City. Approximately 500 members and guests attended the meeting which consisted of general sessions and sectional meetings for health officers, engineers and sanitary officers, public health nurses, and vital statisticians.

The following officers were elected for the ensuing year:

President—Stephen J. Wolff, St. Louis
President-elect—E. A. Belden, M.D., Sikeston
Vice-President—Hugh L. Dwyer, M.D., Kansas City
Secretary-Treasurer—Glen J. Hopkins, Jefferson City

MISSISSIPPI NUTRITION COURSES

THE State Extension Service and the Department of Home Economics of the Mississippi State College, State College, Miss., through the State Nutrition Committee, are sponsoring a series of 3 one day nutrition meetings for three successive months in all the counties of the state.

PERSONALS

Central States

CHARLES F. ABELL, M.D., of Marion, Ind., has been named City Health Officer.

MARVIN F. HAYGOOD, M.D., formerly of the Iowa State Department of Health, has been appointed Chief of the Illinois Division of Local Health Administration, effective July 1. RICHARD F. BOYD, M.D.,* has returned to Illinois from Topeka, Kans., to serve as Assistant to the Chief of this Division.

ALBERT B. HEADLEY, M.D., of Cambridge, Ohio, has been appointed Health Commissioner of Guernsey County, succeeding MARSHALL J. THOMAS, M.D., of Cambridge, resigned.

ALBERT J. HELM, M.D., of London, Ohio, Health Officer of Madison County, has been given jurisdiction over the unit in Union County under a recently adopted plan merging the two units.

WILLIAM E. HOLMES, M.D., of Omaha, Neb., has been added to the Nebraska State Health Department staff as Medical Health Officer.

HUGO V. HULLERMAN, M.D.,† for 2 years Chief of the Illinois State Division of Local Health Administration, is accepting a position July 1, with the Peoria Department of Public Health as Deputy Commissioner and Director of Maternal and Child Hygiene.

WILLIAM E. JENKINSON, M.D., of Mount Vernon, Ind., has been appointed in charge of the Posey County Health Unit.

THADDEUS M. KOPPA, M.D., C.P.H.,† Assistant Director of Epidemiology, Michigan State Department of Health, Lansing, Mich., has been appointed Director. He succeeds WALLACE M. CHAPMAN, M.D.† who has resigned to enter private practice in California. Dr. Chapman was named to the position last year.

PAUL E. LANDIS, Associate Professor of Physical Education at Bowling Green State College, Bowling Green, Ohio, has been named State Supervisor of Health, Physical Education, Recreation and Safety, effective March 1. This position was created within the Department of Education to coöperate with federal defense agencies.

CARL B. MCCORD, M.D., of Veedersburg, Ind., is the new Health Officer in Fountain County.

ALLAN J. MCLAUGHLIN, M.D.,* Passed Assistant Surgeon General, and recently of the Michigan School of Public Health, is now serving the Illinois Department of Public Health, Springfield, Ill., as Medical Administrative Consultant.

CLARENCE B. RAWERS, M.D., of Bergholz, Ohio, has been appointed Health Commissioner of Jefferson County.

IRA LEO SCHAMBERG, M.D., formerly Research Associate in Dermatology and Syphilology at the University of Michigan, Ann Arbor, has been appointed Supervisor of Venereal Disease Control in the Louisiana State Health Department, New Orleans.

SUE HURST THOMPSON, M.D.,† of West Branch, Mich., has resigned as Director of District Health Unit No. 2, comprising the Counties of Ogemaw, Oscoda, Iosco, and Alcona. HAROLD W. SEFF, M.D.,† of West Branch, is the Acting Director, pending a permanent appointment in June.

WILLIAM ROBERT TIPTON, M.D., of Greencastle, Ind., has been appointed in charge of the Health Unit in Putnam County.

FRED O. TONNEY, M.D.,† of Escanaba, Mich., is Director of the new Delta County Health Center at Escanaba.

FRANKLIN H. TOP, M.D.,* of Detroit, has been appointed by the Detroit

* Fellow A.P.H.A.
† Member A.P.H.A.

Board of Health as Medical Director of the Herman Kiefer Hospital, Detroit.

VERNON M. WINKLE, M.D., of Norfolk, Neb., has been named Director of Health Unit Number 1, covering Scottsbluff, Morrill, and Banner Counties; and Temporary Director of Health, of Unit Number 3, comprising Lincoln and Keith Counties.

ELIZABETH I. WORKMAN, M.D., of Columbus, Ohio, has been named Health Commissioner of Delaware County, filling the unexpired term of GEORGE · FREDERICK MOENCH, M.D.,† who went to the W. K. Kellogg Foundation in Michigan.

Eastern States

AUGUSTUS J. HAMBROOK, M.D., of Troy, N. Y., has been appointed Medical Consultant in the Troy Department of Public Welfare, a new position provided for in the 1942 city budget, effective January 1.

REUBEN MUTNICK, M.D.,† of New York, N. Y., has been named Director of the Dodge-Saunders defense area, Nebraska.

JOSEPH SHILEN, M.D.,† of Pittsburgh, Pa., has been appointed head of the Division of Industrial Hygiene of the Pennsylvania State Department of Health, Harrisburg. He succeeds WILLIAM B. FULTON, M.D., M.P.H.,* of Harrisburg, who was appointed Chief of the Division of Health of the U. S. Bureau of Mines.

Southern States

BURTON F. AUSTIN, M.D.,† of Montgomery, Ala., has been named State Health Officer, to succeed the late JAMES N. BAKER, M.D.,* of Montgomery. Dr. Austin has been Acting Health Officer. In 1935 he was named Director of the State Bureau of Hygiene and Nursing, now the Bureau of Maternal and Child Health, a position he held at the time of Dr. Baker's death last November.

JESSIE M. BIERMAN, M.D., M.P.H.,* has resigned from the staff of the Children's Bureau, Washington, D. C., to accept appointment as Chief of the Division of Maternal and Child Health of the California State Department of Health, San Francisco.

REVIS A. BRANNON, JR., M.D., of Utica, Miss., has been named Director of the Southeastern Health District covering George, Green, Stone, and Perry Counties.

CAROLINE H. CALLISON, M.D., of Chatom, Ala., has been named Health Officer of Coosa County, to succeed WILLIAM H. GOFF, M.D., of Rockford, who resigned to enter private practice.

ROBERT L. CHERRY, M.D., M.P.H.,* has resigned as Field Director of Local Health Service, Texas State Department of Health, to accept the position of Director of the Harris County Health Unit, Houston, Tex.

JOHN COLLINSON, JR., M.D., DR.P.H.,* of Baltimore, Md., has been appointed Health Officer of Cecil County, filling the unexpired term of the late CLINTON A. KANE, M.D.,* Perryville, Md.

JOHN W. DABBS, M.D., formerly Health Officer of Geneva County, Ala., has been named Health Officer of the Oktibbeha County Health Department at Starkville.

GEORGE A. DENISON, M.D.,* Acting Health Officer of Birmingham and Jefferson County, Ala., since September, has been appointed Health Officer, effective February 25.

LOYAL D. FARRAGUT, M.D., of Jackson, Tenn., has resigned as Director of the Madison County Health Unit, to enter Army service.

VERNON W. FOSTER, M.D., of Savannah, Ga., has been placed in charge

* Fellow A.P.H.A.
† Member A.P.H.A.

of the newly created Health Unit of Henry County.

VICTOR P. GENGE, M.D., is the new Director of the Lafayette County Health Department, succeeding THOMAS L. OWINGS, M.D., of Oxford, who resigned to enter private practice in Alabama.

DR. WILLIAM E. GRAHAM, formerly with the U. S. Public Health Service, has been appointed Director of the Division of Venereal Diseases of the District Health Department, effective February 5.

JOSEPH HIRSH,† until recently in charge of health and welfare planning with the Federal Public Work Reserve, Washington, D. C., has been appointed Liaison Officer in the Executive Office of the President, Office of Government Reports, Washington.

ISAAC N. JONES, M.D., of Greensboro, Ala., has been appointed in charge of the Hale County Health Unit, succeeding ELDRIDGE T. NORMAN, M.D., of Greensboro, who resigned to resume private practice.

WILLIAM E. MCILVAIN, M.D., of Charleston, W. Va., Director of the Bureau of Tuberculosis of the State Health Department and for the past 2 years in charge of the State's Mobile X-ray Unit, resigned, April 6, it is reported, to enter the U. S. Navy.

THOMAS B. MCKNEELY, M.D., Passed Assistant Surgeon of the U. S. Public Health Service, Washington, D. C., has been assigned to the Medical Division, Office of Civilian Defense, for duties in connection with the organization of emergency medical services.

JOE H. PRICE, M.D., formerly District Health Officer, McLeansboro, Ill., has been appointed Health Officer of Tishomingo County, succeeding WILLIAM R. ARMSTRONG, M.D., of Iuka, who has entered Army service.

SHALER A. RICHARDSON, M.D., of Jacksonville, Fla., has resigned as a member of the State Board of Health, to devote his time to private practice and to his duties as Secretary-Treasurer of the Florida Medical Association.

STARLING D. STEINER, M.D.,† of Baltimore, Md., has been appointed Chief of the Division of Industrial Health of the Maryland State Department of Health. Dr. Steiner has recently been a member of the U. S. Public Health Service staff.

THOMAS B. TURNER, M.D.,* Professor of Bacteriology, Johns Hopkins University School of Hygiene and Public Health, Baltimore, Md., and Lieutenant Colonel in the Medical Reserve Corps of the U. S. Army, has been called into active service as Chief of the Subdivision of Venereal Disease Control in the Surgeon General's Office.

DEATHS

WILLIAM HENRY BEST, M.D.,* Deputy Commissioner of the Department of Health of New York City, died June 3, at the age of 57.

JAMES D. TRASK, M.D.,† Associate Professor of Pediatrics, Yale School of Medicine, New Haven, Conn., died May 24, in Chicago, Ill., at the age of 51. Dr. Trask had been working as a consultant to the Secretary of War on epidemic diseases, with the aid of staff members of the Yale School of Medicine. On April 22, he and his colleague at Yale, JOHN R. PAUL, M.D.,† Professor of Preventive Medicine, received the John Phillips medal of the American College of Physicians for their research on infantile paralysis. Dr. Trask was graduated from the Sheffield Scientific School at Yale in 1913 and received an M.D. from the Cornell Medical School in 1917.

* Fellow A.P.H.A.
† Member A.P.H.A.

CONFERENCES AND DATES

American Chemical Society—National Chemical Exposition, National Industrial Chemical Conference. Stevens Hotel, Chicago, Ill. November 17–22.

American College of Surgeons—Clinical Congress. 32nd Annual. The 25th Annual Hospital Standardization Conference, sponsored by the College, will be held simultaneously. Stevens Hotel, Chicago, Ill. October 19–23.

American Congress of Physical Therapy—21st Annual Scientific and Clinical Session. Hotel William Penn, Pittsburgh, Pa. September 9–12.

American Hospital Association. St. Louis, Mo. October 12–16.

American Public Health Association—71st Annual Meeting. Headquarters, Municipal Auditorium, St. Louis, Mo. October 27–30.

American Public Works Association. Cleveland, Ohio. October 18–21.

American Society of Civil Engineers—Summer Meeting. Upper Mississippi. July. Fall Meeting. New England. October.

American Water Works Association—
- Michigan Section — Park Place Hotel, Traverse City, Mich. September 9–11.
- Rocky Mountain Section—Frontier Hotel, Cheyenne, Wyo. September 17–18.
- Western Pennsylvania Section — Roosevelt Hotel, Pittsburgh, Pa. September 18.
- Minnesota Section—Lowrey Hotel, St. Paul, Minn. September 24–26.
- Four States Section—Benjamin Franklin Hotel, Philadelphia, Pa. October 7–9.
- Southwest Section—Little Rock, Ark. October 12–15.
- Kentucky-Tennessee Section—Irving Cobb Hotel, Paducah, Ky. October 19–21.
- Missouri Valley Section—Coronado Hotel, St. Louis, Mo. October 22–24.
- California Section—Hotel Oakland, Oakland, Calif. October 28–30.
- North Carolina Section—Washington Duke Hotel, Durham, N. C. November 2–4.

Civil Service Assembly—Annual Conference. St. Paul, Minn. October 1–3.

Conference on Human Development and Education—sponsored by the University of Chicago, the Commission on Teacher Education, and the Department of Supervisors and Directors of Instruction. University of Chicago, Chicago, Ill. August 10–21.

Federation of Sewage Works Association. Cleveland, Ohio. October 15–17.

Indiana State Medical Association — 93rd Annual Session. French Lick, Ind. September 29–October 1.

International Association of Milk Dealers. Peabody Hotel, Memphis, Tenn. October 22–24.

Michigan Public Health Association. Grand Rapids, Mich., November 11–13.

National Association of Public School Business Officials. Cleveland, Ohio. October 5–8.

National Association of Social Workers—Delegate Conference. October.

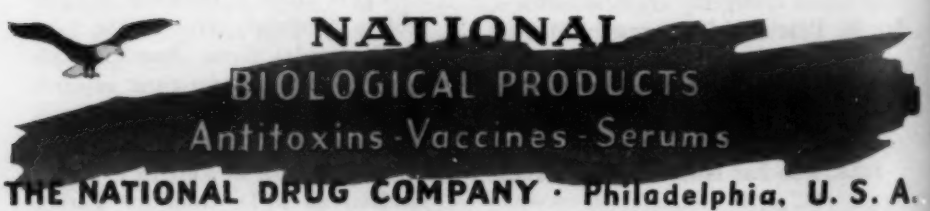
National Education Association. Denver, Colo. June 27–July 2.

National Probation Association. Asheville, N. C. October 19–23.

National Recreation Association. Cincinnati, Ohio. September 28–October 2.

National Safety Council. Chicago, Ill. October 5–9.

New Mexico Public Health Association. Raton, N. M. October.

New York State Association of Milk Sanitarians—20th Annual Conference. DeWitt Clinton Hotel, Albany, N. Y. September 23–25.

Tennessee Public Health Association. Nashville, Tenn. September.